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Florida and Mexico Competition for the Winter Fresh Vegetable Market

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ABSTRACT

Florida eggplant producers had the competitive edge over Mexican producers during the 1984/85 winter season, but the Mexicans had the advantage in supplying U.S. vegetable markets with fresh tomatoes, cucumbers, bell peppers, green beans, and squash. That edge will survive if U.S. prices remain high enough to offset Mexico's high marketing costs and if Florida suffers more damaging frosts. U.S. border fees contribute to Mexico's high costs. Enterprise budgets and weighted average prices are used to assess cost and price advantages of producing six winter fresh vegetables in Florida and the west Mexico state of Sinaloa. Cost and price advantages are used to measure the net competitive advantage of producing each of the vegetables and supplying U.S. markets. Production practices and technological changes are discussed.

Keywords: fresh vegetables, cost of production, cost advantage, price advantage, net competitive advantage, Florida/Mexico competition.

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SUMMARY

Florida producers held a competitive edge over Mexican producers in eggplant during the 1984/85 winter production season, but the Mexicans had the advantage in supplying U.S. vegetable markets with fresh tomatoes, cucumbers, bell peppers, green beans, and squash. That advantage will likely continue if U.S. prices remain high enough to offset Mexico's high total costs and if Florida continues to suffer damaging frosts.

This report uses enterprise budgets and weighted average prices to assess the cost and price advantages of producing the six winter fresh vegetables in Florida and the west Mexico state of Sinaloa. The cost and price advantages are used to measure the competitive advantage of producing each of the vegetables and supplying U.S. vegetable markets. Production practices and technological changes are also discussed.

Sinaloa is Florida's main competitor for producing and marketing winter fresh vegetables to the U.S. market. Sinaloa, traditionally supplying the western markets, is blocked by high transportation costs from eastern markets which Florida dominates. Both areas compete in the Midwest. December through April, the main period of competition, are the months of heaviest production in both areas as well as a high frost-risk time for Florida. Competition is most fierce in winter fresh tomatoes.

Florida remains the dominant supplier of the six vegetables during the May to June period. Increasing spring vegetable acreage and heavy replanting to offset freeze losses have helped Florida dominate markets for tomatoes, bell peppers, and green beans for the production season. Widespread use of plastic mulch, double cropping, and higher yielding tomato and eggplant varieties has increased Florida's yields and reduced production costs.

Sinaloa growers can produce winter fresh tomatoes, bell peppers, cucumbers, green beans, squash, and eggplant more cheaply than can Florida growers. But, import and export fees at the U.S. border increase total costs for Sinaloan producers beyond total Florida costs for all vegetables studied except cucumbers. Any major reduction in border fees on vegetables could shift the cost competitive advantage for all vegetables to the Sinaloan growers.

Adverse weather, however, has dulled Florida's cost advantage; the Sinaloan producers' ability to meet U.S. market demand when Florida supplies are reduced has shifted the price advantage to Mexico. Market share has increased for Sinaloa for all six vegetables during the past few production seasons. Damaging weather in Florida has periodically reduced fresh vegetable supplies and hiked prices in U.S. markets during the highly competitive December to April period. Sinaloan producers will ship vegetables to the United States as long as prices remain high enough to cover duties and transportation costs in addition to production costs.

A peso devaluation in 1976 gave temporary relief to Sinaloan growers from inflating input prices, thus enhancing their production cost competitive position. The advantage, gradually shifting back to Florida, reversed its direction in 1981 and 1982 with two more peso devaluations. Florida producers have since strengthened their cost competitive advantage as improved varieties and new production techniques reduce costs.

Labor is the highest of the input costs which have been generally increasing since 1978 in both countries. While U.S. labor costs have risen yearly, the rural real wage rate in Mexico has dropped 37 percent since 1980 and is now at 1978 levels. Mexican wage rates in 1983 were 11 percent of those paid in Florida.

Fertilizer and imported chemicals, cartons, and seed are expensive for Sinaloan producers while land rent is the significant cost for Florida's producers, due mainly to urbanization and the economic pressure to divert land to higher paying uses.

Florida and Mexico Competition for the Winter Fresh Vegetable Market

Katharine C. Buckley John J. VanSickle Maury E. Bredahl
Emil Belibasis Nicholas Gutierrez

INTRODUCTION

Tender fresh vegetables available in U.S. markets during the winter months are supplied by Florida and the state of Sinaloa, Mexico. The ability of these two areas to regularly provide the required quantity and quality of fresh vegetables has increased competition between Florida and Mexican producers in both the U.S. and Canadian fresh vegetable markets. Changes in supplies from one production area directly affect market price and net returns to producers in the other area.

Several analysts have examined competition between Florida and Mexico in supplying winter fresh produce (8, 11, 14).* Their studies assessed the competitive situation and factors influencing the situation for selected commodities for the 1967/68, 1973/74, and the 1974/75-1978/79 winter production seasons, respectively.1/

This study assesses changes in the competitive positions of Florida and Mexico between the 1978/79 and 1983/84 production seasons. Specific objectives are to:

(1) assess trends in competition between Florida and west Mexico in supplying fresh winter vegetables to U.S. markets;

(2) determine the cost competitive position of Florida and Mexico in supplying fresh tomatoes, bell peppers, cucumbers, squash, eggplant, and green beans to U.S. markets during the 1984/85 production season;

(3) describe and assess changes in production technology in the two production areas; and

(4) describe the effects of selected macroeconomic and policy variables, such as input price inflation and peso-dollar exchange rates, on the cost competitive position of Florida and Mexico.

Competitive advantage between two areas in producing and marketing a commodity depends on the net returns growers in each area receive from producing that commodity. Existence of a competitive advantage is determined by analyzing the total cost of producing and marketing between regions for a specific commodity and the average price received for the commodity in each region. Simply stated, a competitive advantage exists if producers in a supply region have higher net returns over producers in another supply region. This occurs through lower production and marketing costs in one region relative to another

*Underscored numerals in parentheses refer to items in References.

1/ The winter vegetable production season extends from late October through June of the following year.

(cost advantage), or the receipt of higher weighted average prices by producers in a region relative to that received by producers in a competing region (price advantage), or both. Summation of the cost and price advantages in an area provided a measure of that area's net competitive advantage.2/

Florida traditionally is the dominant supplier of winter fresh vegetables in eastern U.S. markets while Mexico dominates western markets. Both areas compete in the Midwest. Competition occurs at that geographical point where production and marketing costs from the two areas are equal. The inability of either supply region to meet demand in their traditional markets may temporarily increase the area of competition and provide a greater net competitive advantage to producers in the other supply region.3/

This study evaluates competition between Florida and Mexico at the f.o.b. level (that is, south Florida and Nogales, AZ).4/ However, the competitive situation can be assessed for any U.S. wholesale-retail market by adding the cost of transportation between the f.o.b. point and the selected wholesale-retail market to the total cost estimates provided in this report (see tables 41 and 43).

This study develops cost of production estimates using budgeting techniques for fresh tomatoes, bell peppers, cucumbers, squash, eggplant, and green beans in Florida and west Mexico. The cost estimates were determined by surveying growers and others involved in the production and marketing of each commodity. Participants represented the predominent technology used in each growing area. Costs included preharvest costs, harvest and packing costs, and marketing costs. Simple and weighted averages of prices received for Florida and Mexican vegetables were used to determine net returns received by producers in each area. Average price estimates for each commodity were derived from statistics published by the USDA Federal-State Market News Service for vegetables from each area and from statistics published by commodity organizations.5/ The cost estimates and average prices are representative of the winter period when Florida and Mexico compete in the U.S. domestic fresh vegetable market.

THE WINTER VEGETABLE INDUSTRY

Florida fresh winter vegetables are produced primarily in the southern half of the State where adequate winter growing conditions usually prevail (fig. 1). The west central region (Plant City, Palmetto-Ruskin, and Wauchula areas) has historically produced green beans, cucumbers, eggplant, bell peppers, squash, and tomatoes. These commodities are also produced in the southeast region (Pompano and Homestead). Fresh winter vegetable production in the east central region (Ft. Pierce) primarily consists of tomatoes, while cucumbers,

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2/ Net competitive advantage is a partial equilibrium measure of absolute cost price differences between two supply regions. Thus, it should not be confused with comparative advantage, or general equilibrium measures of relative cost efficiencies between two regions or nations.

3/ Assuming producers in the competitive supply region are able to meet the increased demand, a price advantage may be gained through the receipt of higher prices caused by short supply.

4/ Nogales is the main point of U.S. entry for Mexican vegetables.

5/ Florida Tomato Committee and Mexican state and national cooperative federations.

eggplant, peppers, and squash dominate in the southwest region (Immokalee and Naples) (6). Shifts in production have periodically occurred between regions, the causes for which will be discussed in a later section of this report.

Most production of winter fresh vegetables in Mexico occurs in the state of Sinaloa (fig. 2). Three areas within Sinaloa--Los Mochis, Guasave, and

Figure 1

Florida, USA:
Major Growing Areas for Fresh Winter Vegetables

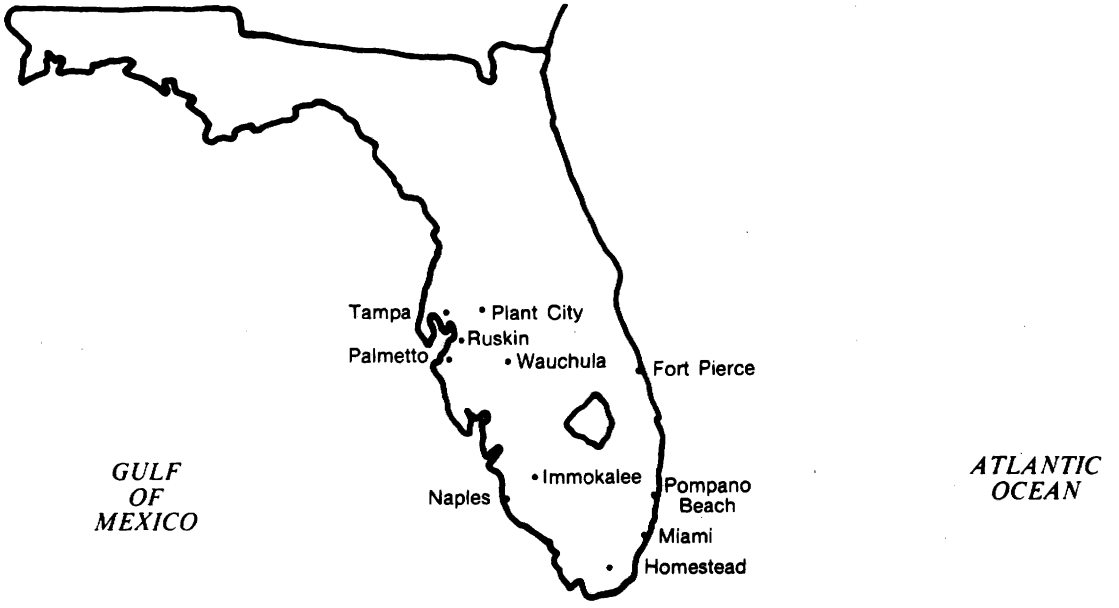
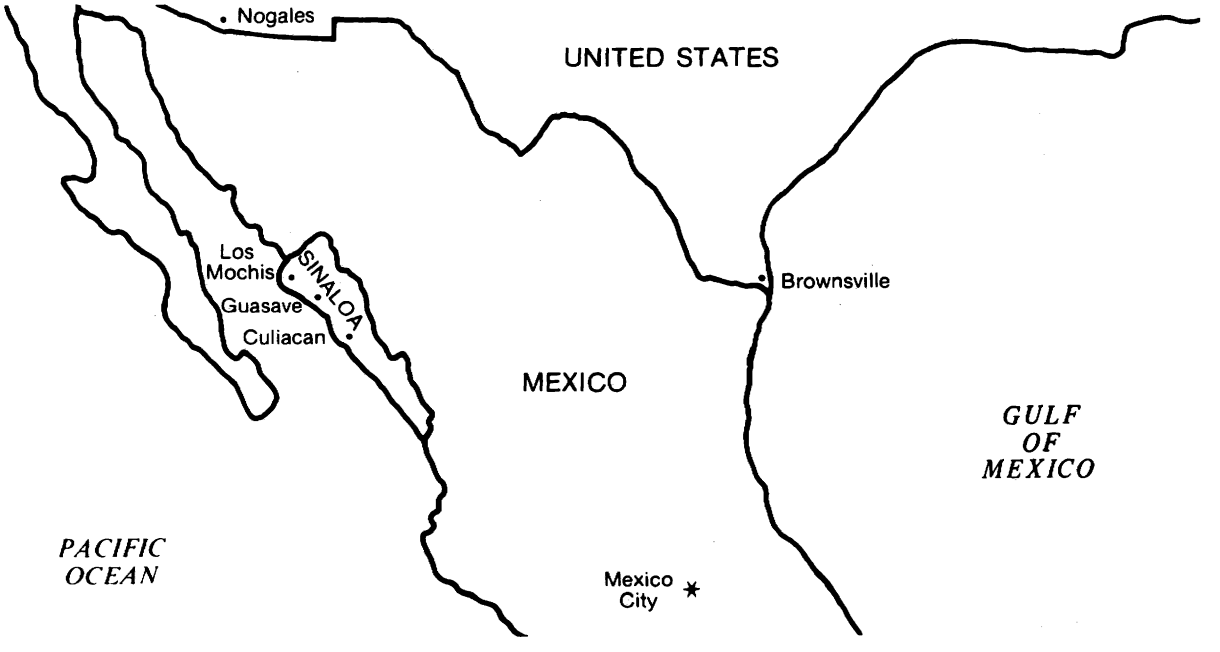


Figure 2

Sinaloa, Mexico:
Major Growing Areas for Fresh Winter Vegetables



Culiacan--actively produce winter fresh vegetables for export primarily to U.S. and Canadian markets. Vegetable production for export was encouraged by expansion of the railroad system from Nogales, AZ, to northern Sinaloa in the early 1900s. Later completion of a highway system between Nogales and Culiacan, in addition to U.S. private sector financing of industry expansion, encouraged growers to increase export production. Total export value of winter fresh vegetables from Mexico reached $278 million during the 1983/84 season, roughly half the $555 million received by Florida vegetable producers (table 1).

Marketing Channels

Marketing channels for winter fresh vegetables produced in Florida and in Sinaloa (for export) are similar after the Mexican vegetables clear Mexican and U.S. customs agents. The following section describes the industry and marketing channels for both regions.

Florida

Fresh vegetables usually move directly from the field to packing plants (fig. 3).6/ At this point, vegetables are washed, sized, sorted, and packed. For tomatoes, grading also occurs at the packing plant.7/

6/ Some growers pack peppers and eggplant in the field using portable packing sheds.

7/ Fresh market tomatoes are picked either at the vine-ripe or mature green stage of maturity. Mature green tomatoes are picked at the growth stage where fruit color has changed from dark green to a whitish-green; vine-ripe tomatoes mature on the vine until pink in color. Tomatoes harvested at the mature green stage are degreened, or ripened, by storing them in temperature-controlled rooms for 1-3 weeks. Ethylene gas is often applied during storage to accelerate the degreening process.

Table 1—Fresh winter vegetables: Production and value in Florida and west Mexico, 1983/84 season

Vegetables	Florida 1/		Mexico 2/	
	Production	Value	Production	Value 3/
	Thousand metric tons	Million dollars (U.S.)	Thousand metric tons	Million dollars (U.S.)
Tomatoes	609	368	249	149
Others 4/	362	187	190	129

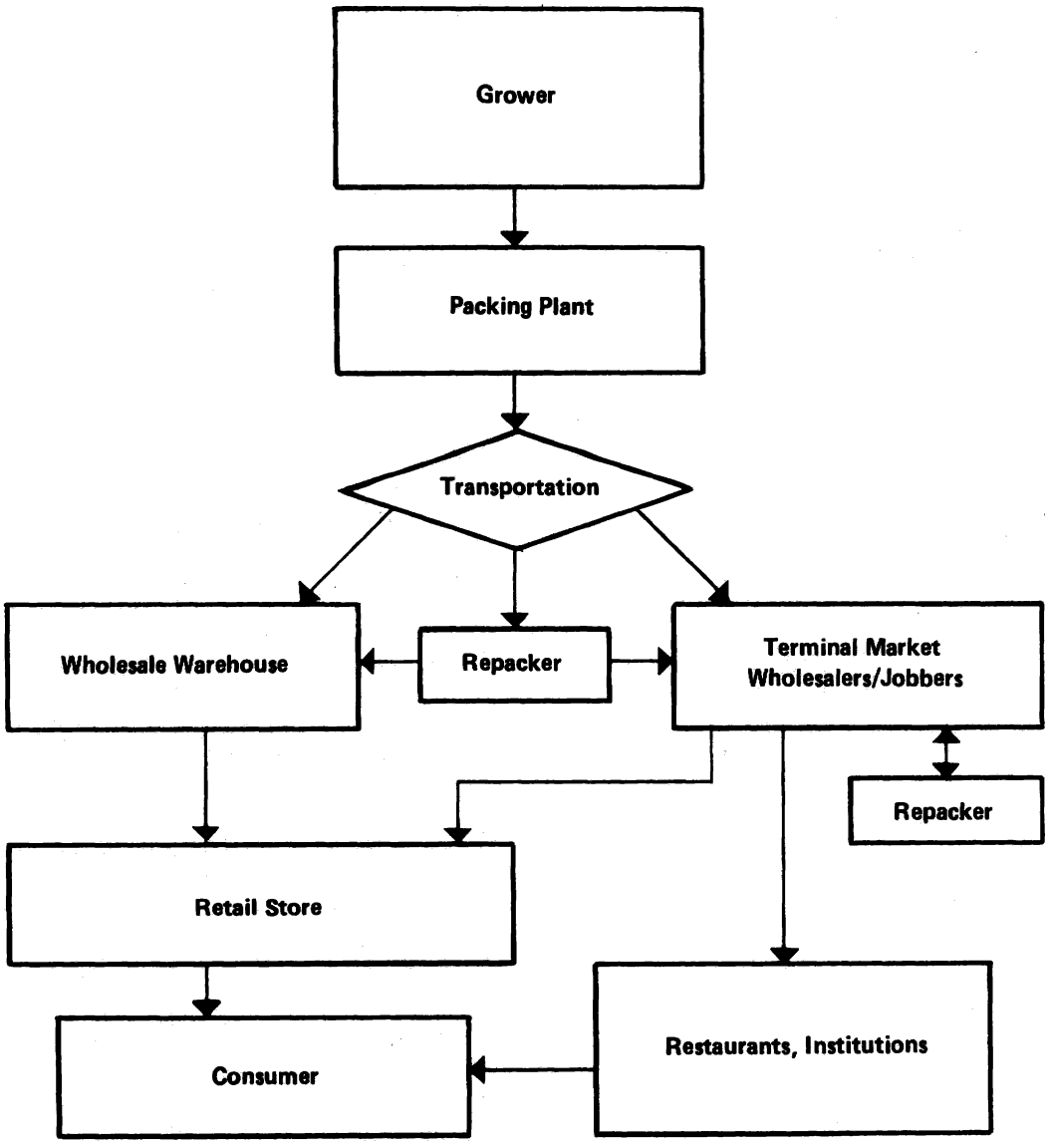
1/ Based on (6).
2/ Based on (4).
3/ Calculated using prices reported in (1) and quantities reported in (4). Values of green beans were calculated using Florida prices reported in (6) and Mexican export production reported in (4).
4/ Includes green beans, cucumbers, eggplant, peppers, and squash.

Packing plants usually accommodate several growers. However, large vegetable producers may have their own packing and shipping facilities. About 20 firms account for 90 percent of all tomato packing in Florida.

Vegetables are moved to terminal or wholesale markets primarily by truck, though rail transportation is often used for vegetables shipped long distances. Mature green tomatoes may be ripened during transit through use of portable ethylene generating equipment. Terminal or wholesale markets handle and deliver vegetables from warehouse storage facilities to retail store storage facilities or facilities maintained by restaurants or institutions.

Figure 3

Marketing Channels for U.S. Fresh Vegetables from Grower to Consumer



Source (10).

Mature green tomatoes may be shipped to repackers for ripening, resorting according to maturity (color), and packaging before being moved to distribution centers. Use of repackers in the tomato marketing chain has decreased in recent years because of increasing repacking costs.

Figure 3 illustrates the principle commercial marketing channels for fresh vegetables in the United States; but, alternative routes also exist. For example, vegetables may move directly from the packing shed to the warehouse of an integrated wholesale-retail grocery chain before distribution to retail stores and finally the consumer.8/ Vegetables may also move through secondary wholesalers. Secondary wholesalers purchase produce from primary wholesalers and resell to other wholesalers such as jobbers and truck jobbers.9/

Most vegetables are sold over the telephone by contractual arrangements between shipping point operators and local buyers or customers in terminal markets. These contractual agreements facilitate shipping logistics and assure marketing outlets for highly perishable vegetables. Market integrity is maintained by custom, trade ethics, and trade laws.

Mexico

Export marketing channels for Mexican fresh vegetables are much the same as channels for U.S. vegetables once the vegetables clear customs (fig. 4). Vegetables move from fields to packing sheds where they are sorted and packed in cartons for export shipment. Between 60 and 70 percent of these packing sheds are located in the Culiacan River Valley.10/ Most Mexican growers have their own packing sheds and market vegetables with their individual grower-shipper labels.

Almost all of the Sinaloa vegetables flow through Nogales where a thriving vegetable import business has developed to service the needs of Mexican vegetable producers. Before moving to the wholesale distributors, vegetables are temporarily held in a compound on the Mexican side of Nogales for inspection and customs procedures. Sonora Mexican custom brokers collect export fees, process export documentation including the paperwork for repatriating export earnings, and oversee movement of produce to the American side of the border. At that point, vegetables are moved to a wholesale warehouse where U.S. custom brokers assume responsibility for collecting import tariffs, processing export documentation, providing inspection certificates, and any other activity required to move the produce to distributors. Many firms serve as custom brokers on both sides of the border, but a few firms handle a very large proportion of the produce that crosses the border. Three firms handle most of the produce on both sides. Mexican export fees are set by the Mexican Government; therefore, nonprice competition determines the distribution of exports among brokerage firms. On the U.S. side, competition between custom brokers is keen. Nonprice factors are believed most important in determining the distribution of imports among firms.

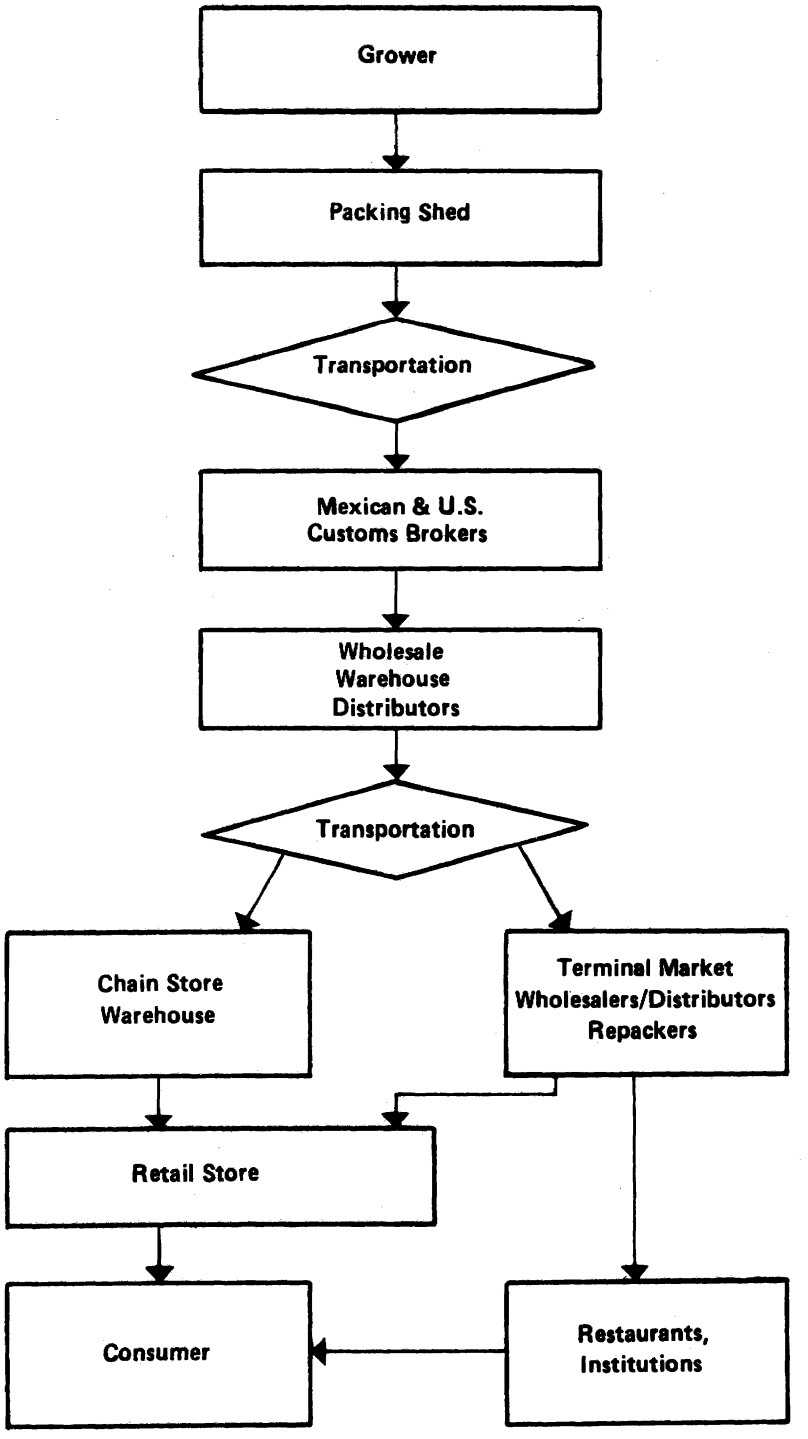
8/ Integrated wholesaler-retailers are organizations that maintain their own integrated wholesale warehousing facilities as well as retail store outlets.

9/ Jobbers purchase produce from local wholesalers for resale to retail stores and institutional outlets. Business is conducted through their own stores while truck jobbers operate from their own trucks. Both take title to the produce they handle.

10/ Unofficial USDA-AMS personnel estimates.

Figure 4

Marketing Channels for Mexican Fresh Vegetables from Grower to U.S. Consumer



Source: (10).

Distributors in Nogales handle all aspects of the wholesale distribution and produce sales. Distributors sort vegetables according to maturity before shipping to terminal market wholesalers and distributors or directly to retail stores. Many distributors also play an active role in vegetable production as well. Depending on the working relationship with individual growers, they may provide seed and other inputs usually imported from the United States, technical and market information, and preharvest financing. Upon start of the delivery of produce to Nogales, they may also provide picking advances to assist in financing the harvest.

The most prevalent form of association between a Mexican grower and a distributor is a partnership. Approximately 60 percent of the distributors in Nogales are partners with one or more Mexican growers. These firms handle an estimated 60 percent of the Mexican produce. Another 20 percent of the distributorships are owned outright by Mexican growers and managed by a U.S. citizen; these firms handle an estimated 10 percent of produce imports. The remaining 20 percent are called "independents" and contract with Mexican growers for produce. These firms handle an estimated 30 percent of produce imports. The total number of distributors has increased and the business has become less concentrated than was true 10 years ago when 10 firms handled about 50 percent of the produce. Currently, 15 distributors are estimated to handle the same proportion, while 75 percent of all produce imports are handled by 25 distributors.11/

During the production season, some vegetables may flow directly to brokers or chain store buyers who temporarily locate in Nogales. These operators usually have no physical storage or handling facilities in the area; purchases are shipped directly to chain store warehouses for distribution to retail stores.

Production and Trade Organizations and Regulations

Grower organizations support and protect the interests of vegetable growers in Florida and Mexico. These organizations often influence policy decisions and directly affect the competitive positions of producers in both supply areas.

Florida

Several organizations represent the Florida vegetable industry, including the Florida Fruit and Vegetable Association (FFVA), the Florida Farm Bureau Federation, the Florida Tomato Committee, and the Florida Tomato Exchange. The FFVA is a cooperative association of growers and shippers which sponsors programs for all commodities in the produce industry. Among other activities, it supplies information used to make policy decisions concerning foreign trade. The Florida Farm Bureau also provides support in legislative efforts aimed at protecting the interests of the vegetable industry.

The Florida Tomato Committee, a growers' committee, governs the regulations of Federal Marketing Order No. 966. This marketing order covers most tomatoes grown in Florida and all tomatoes imported during the regulated season, roughly October to June of each year. The committee recommends to policymakers regulations that must be adhered to for all tomatoes grown in the Florida production area and those imported into the United States during the regulation season. The committee sets size, grade, container, and inspection requirements (see app. A).

11/ Estimates derived from interviews with Mexican distributors.

The Florida Tomato Exchange provides collective action with respect to the production, marketing, and distribution of fresh Florida tomatoes; that is, tomato promotion, production research, legislative activities, and legal aid on items affecting the tomato industry and other items not permitted in the marketing order.

Mexico

Production and marketing of fresh vegetables for export are coordinated through State and national cooperative federations. Area planted in vegetables on irrigated land is regulated by the Mexican Government through recommendations provided by the State federation (CAADES) and the Union Nacional de Productores de Hortalizas (UNPH), the national vegetable growers association. In addition to its influence over area, the UNPH also controls the quality and quantity of vegetables exported. During periods of low prices, the UNPH usually will set stricter quality standards which limits supply and encourages higher prices. Inspection may be requested for cucumbers, bell peppers, and squash. However, Mexican tomatoes must be inspected and comply with minimum U.S. import regulations under the Federal Market Order. There are no minimum grade and size requirements for U.S. imports of other vegetables. CAADES is responsible for the control and collection of export fees.

Competitiveness of Florida versus Sinaloan Winter Fresh Vegetables

The winter fresh vegetable season in Florida, extending from late October through May or June of the following year, coincides with that in Sinaloa. Both areas ship vegetables to all regions in the United States, but the heaviest competition occurs from December through April, when both areas are in full production and the possibility of crop damage from adverse weather in Florida is greatest.12/ A supply reduction in Florida increases competition in markets traditionally dominated by Florida.

The greatest competition occurs in the supply of winter fresh tomatoes. Tomatoes are the primary winter fresh vegetable crop produced in Florida and Mexico. During 1983, 86 percent of all U.S. winter tomato production originated in Florida (12). Moreover, almost 99 percent of all winter fresh tomatoes imported originate in Mexico, mostly from Sinaloa. The harvest season in Mexico is most active between December and June. The market is quick to react to any production disruptions in Florida by shifting purchases to Mexican produced tomatoes to satisfy U.S. needs. For example, during the week following the January 1985 freeze in Florida, Mexican tomato shipments increased 16 percent over the previous week, while Florida shipments declined 54 percent during the same period (2).

Almost 90 percent of Sinaloa tomatoes exported to U.S. markets are vine-ripened. However, harvest at the mature green stage is increasing due to reduced labor costs, greater ease in handling and shipping, increased potential for supplying markets located further from the production area, and wider acceptance in U.S. markets for tomatoes of this type. Florida produces primarily mature green tomatoes. Increased Mexican production of mature greens may heighten competition in the market.

12/ The possibility of severe frost in Sinaloa is nearly zero. However, vegetable production is frequently affected by extreme temperature variations and prolonged periods of rainy, cloudy, or cool weather.

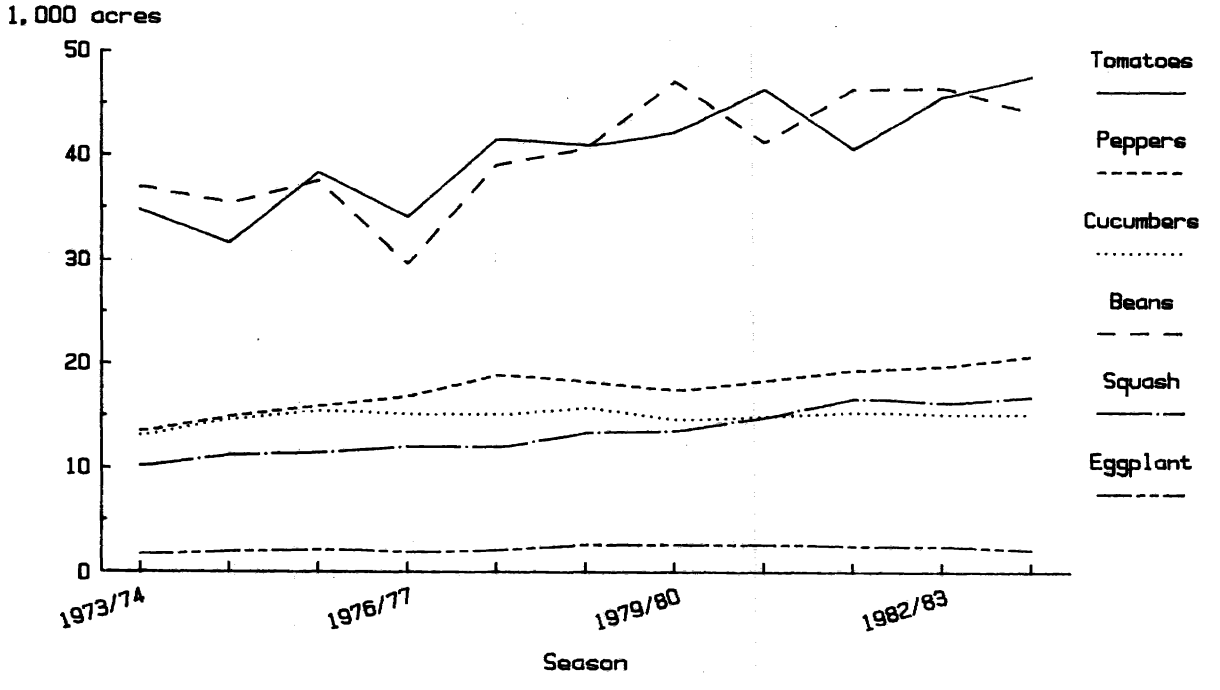
Cucumber production in Florida and Sinaloa is more complementary than competitive. Cucumbers are temperature sensitive and susceptible to damage from frost. Most cucumber production in Florida occurs early and late in the winter season, when the risk of damage from frost is reduced. Conversely, rainy weather conditions and disease problems restrict cucumber production in Sinaloa to the midwinter months. Therefore, Florida and Sinaloan cucumbers do not always enter the market during the same time period and competition is reduced.

PRODUCTION AND TRADE TRENDS

Vegetable production in Florida and Mexico has dramatically increased over the last decade. In Florida, the total value of the six commodities included in this study increased from $201.4 million in 1973/74 to $554.5 million in 1983/84, a 175-percent increase. The total value of Mexican vegetables increased 98 percent over the same period. Increased total value in each area can be attributed to gains in total production, either because of additional planted acres or higher yields, and relatively higher prices received by producers since 1973/74.

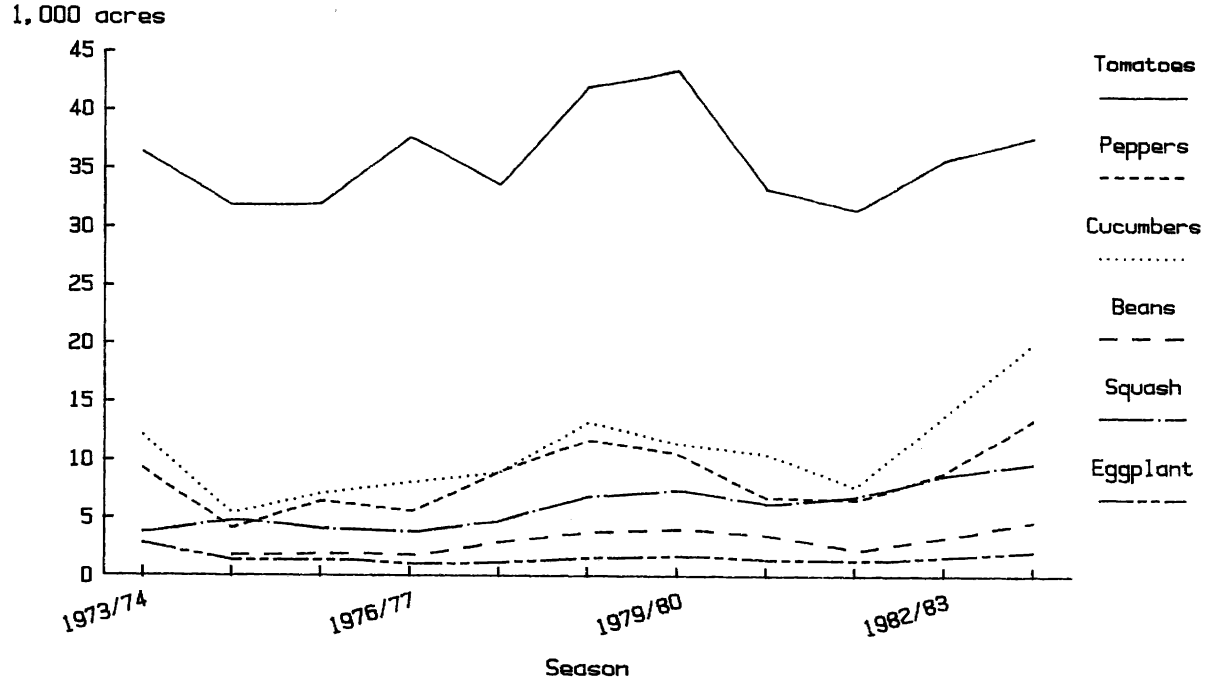
All commodities included in this study showed increases in planted area over the past 10 years, except cucumbers in Florida and eggplant in Sinaloa (figs. 5 and 6). Substantial yield increases for tomatoes, cucumbers, and squash over the past 10 years have also spurred Florida's production (fig. 7). Sinaloan producers have increased productivity through improved yields of tomatoes, bell peppers, and eggplant (fig. 8). The following sections examine changes in area, yield, production, and value occurring for each of the six commodities in Florida and Sinaloa. These factors are important in explaining

Figure 5
Vegetable Acres Harvested in Florida



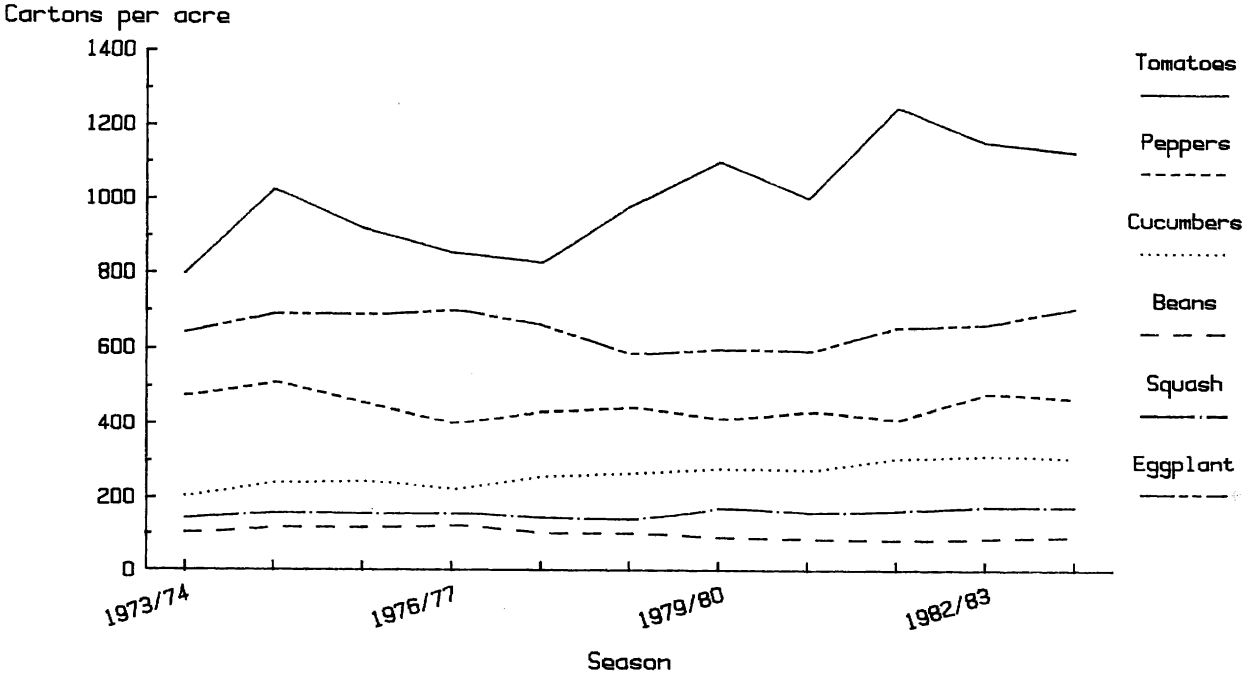
Source: (6).

Figure 6
Vegetable Acres Planted in Sinaloa



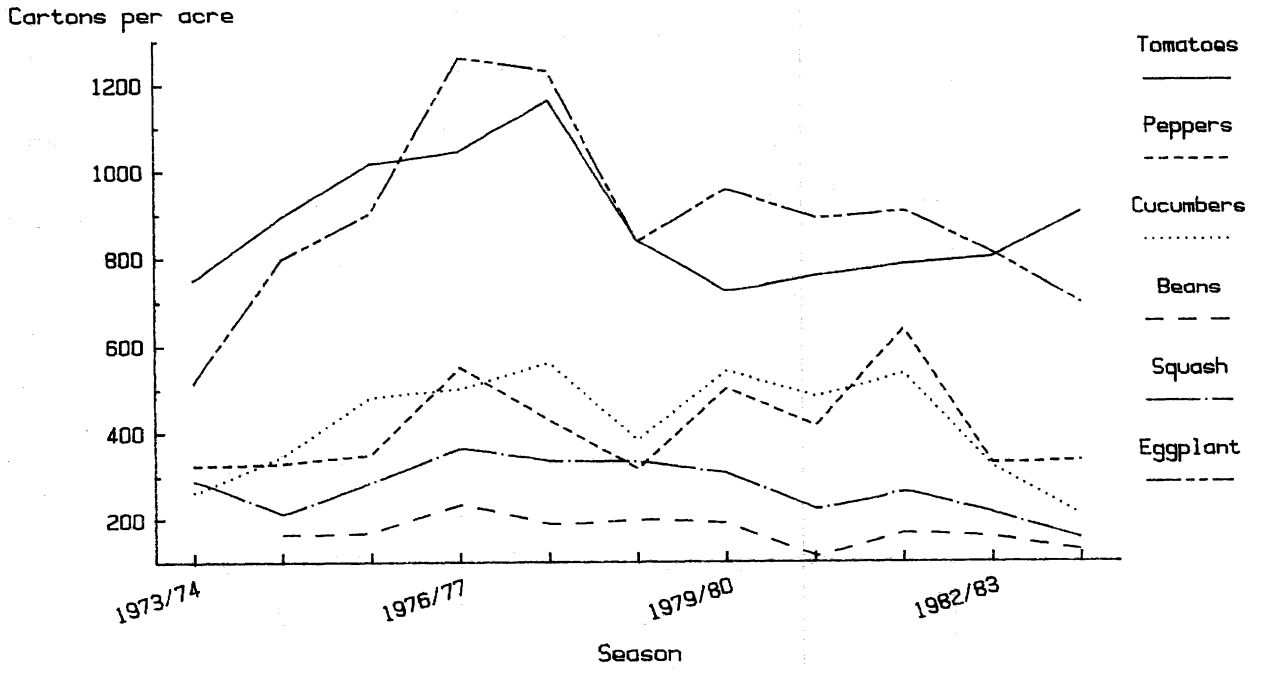
Source: (4).

Figure 7
Vegetable Crop Yields in Florida



Source: (6).

Figure 8
Vegetable Crop Yields in Sinaloa



Source: (4).

changes in total shipments and market shares which are major indicators of the competitive positions of Florida and Sinaloa.

Tomatoes in Florida

Tomato production in Florida has rapidly expanded during the past 10 years despite frequent bouts with bad weather during the winter season.

Area, Yield, Production, and Value

Tomato production in Florida almost doubled in the last 10 seasons because of increased area and yields (table 2). Tomato area planted and harvested, yields, and total production all increased since the 1973/74 season (figs. 9, 10, 11, and 12). Tomato area planted and harvested increased 39 and 37 percent, respectively, since 1973/74. Yield per acre increased from an average of 796 cartons per acre to 1,128 cartons, a 42-percent increase. Despite an increase in planted area during the 1976/77 season, adverse weather significantly reduced area harvested and yields. Poor weather conditions also contributed to poor yields during the 1977/78, 1980/81, 1982/83, and 1983/84 production seasons. However, the continued upward trend in yields can be attributed to several factors. One is the widespread adoption of hybrid varieties which are higher yielding than traditional varieties.13/ Increased use of hybrid varieties and other improvements in production technology may have contributed to the reduced variability around the trend in production which has occurred since 1981/82 (fig. 12). Also, more substantial increases

13/ Other factors are discussed in the summary of current tomato production practices in Florida.

Table 2—Florida fresh tomatoes: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per carton	Total value
	Planted	Harvested				
	--- Acres ---		Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	35,500	34,700	796	27,624	4.39	122,342
1974/75	31,700	31,500	1,026	32,316	4.57	148,709
1975/76	38,700	38,300	918	35,151	4.59	162,649
1976/77	43,200	34,000	854	29,052	5.30	155,019
1977/78	42,100	41,500	826	34,260	5.28	182,284
1978/79	41,300	40,800	981	40,008	5.47	220,216
1979/80	42,900	42,200	1,102	46,492	5.23	244,240
1980/81	47,000	46,300	1,003	46,432	5.49	256,584
1981/82	41,300	40,500	1,250	50,632	5.23	266,306
1982/83	45,600	45,600	1,154	52,640	7.39	390,612
1983/84	49,300	47,600	1,128	53,712	6.83	367,955

1/ Net weight approximately 25 pounds.

Source: (6).

Figure 9
Trend in Tomato Area Planted, Florida

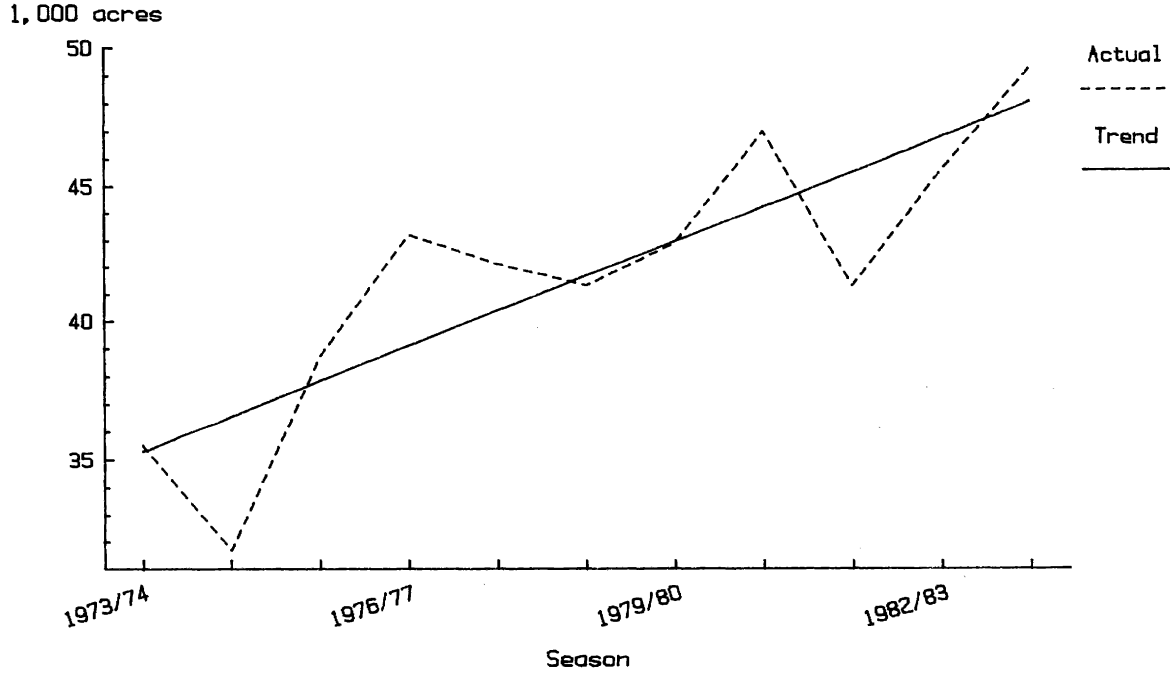


Figure 10
Trend in Tomato Area Harvested, Florida

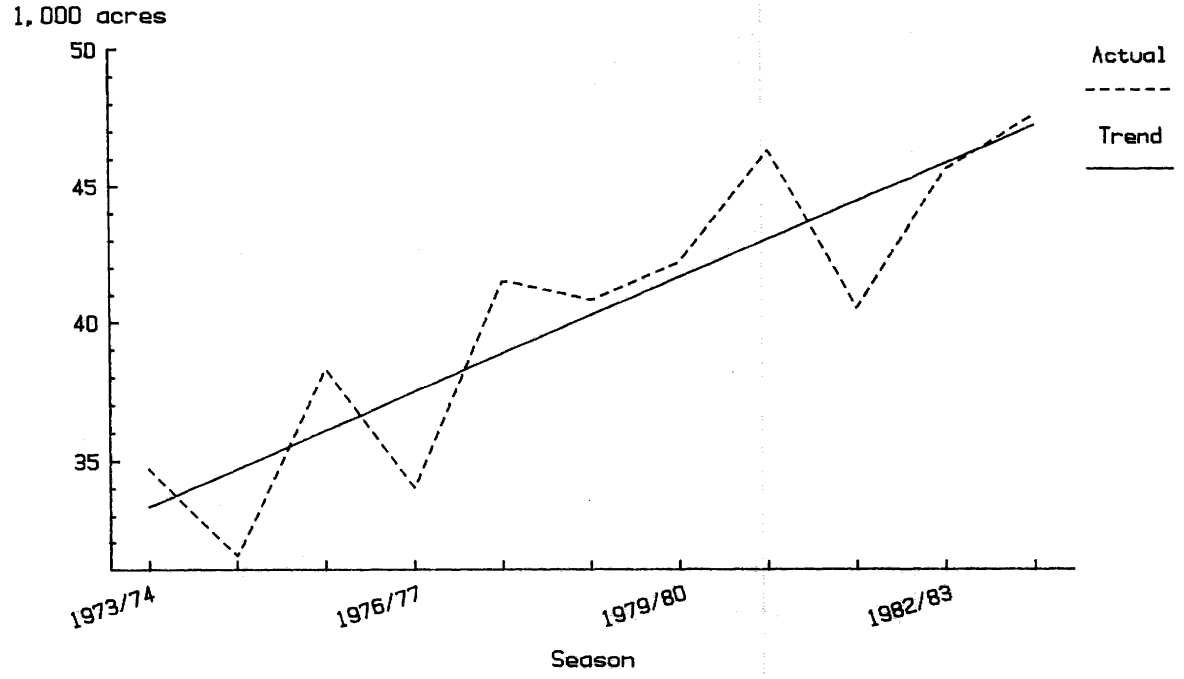


Figure 11
Trend in Tomato Yields, Florida

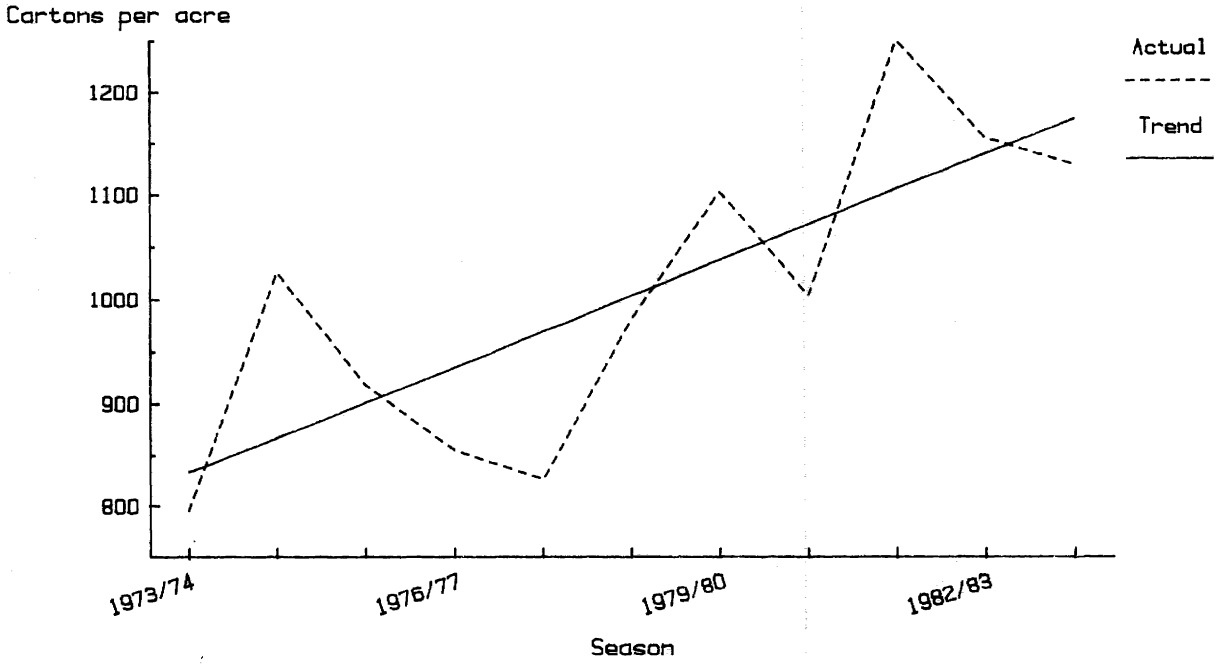
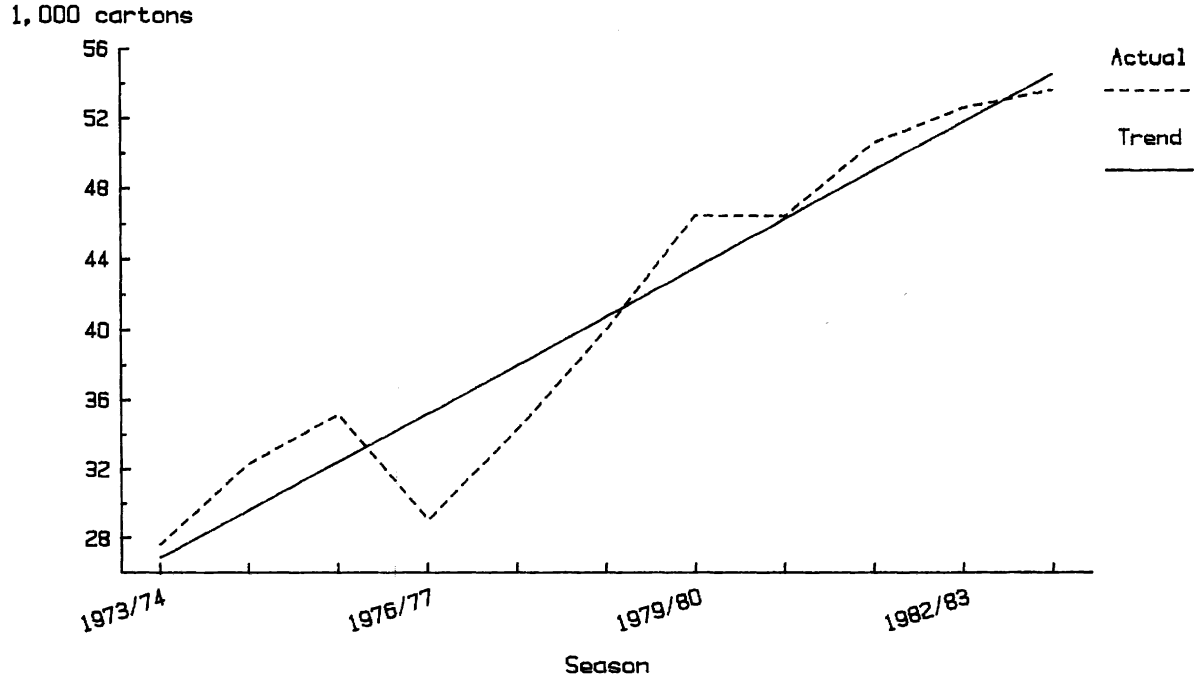


Figure 12
Trend in Tomato Production, Florida



in production and yields might have occurred had producers not experienced killing freezes during four of the last five production seasons.

Tomatoes accounted for 34.7 percent of the total value of all vegetables produced in Florida during 1983/84 (6). The value of the tomato crop increased from $122 million in 1973/74 to $368 million in 1983/84, an increase of 200 percent in nominal dollars. However, deflating the 1983/84 crop value by the consumer price index (1983 = 298.4) to adjust for inflation results in a figure of $123 million, an increase of only 0.8 percent in real dollars.

Production Area

Tomatoes are produced in most areas of Florida that grow vegetables with the exception of the muck soils around Lake Okeechobee (fig. 1). Prominent production areas include: (1) the Manatee-Hillsborough area (also referred to as the Palmetto-Ruskin area), which lies south and east of Tampa in west central Florida; (2) the Collier-Hendry area in southwest Florida which extends around Immokalee and Naples; (3) the Dade County area around Homestead; and (4) the area stretching along the east coast between Fort Pierce and Pompano Beach. Harvesting begins in October and November and extends through June and July. Areas centrally located in the State typically begin picking during the early part of the harvest season. Harvest activity moves south as winter approaches, concentrating in Dade County, the lower east coast, and the southwest during midwinter.

Shifts in Production

Production increased in each of the major producing areas over the past 7 years (table 3). Total acreage harvested in Dade County increased yearly from 1977/78 to 1980/81, when a high of 13,000 acres was achieved. A freeze in

1981/82 reduced the number of acres harvested to 10,900. However, acres harvested during 1982/83 and 1983/84 almost returned to the 1980/81 level.

The southwest (Collier-Hendry) area of Florida experienced only a minor increase in the number of acres harvested, mainly because of the area's susceptibility to freezes. A severe freeze may destroy plants at which time producers often replant as soon as possible. When replanted acreage matures, markets may become glutted, thereby resulting in reduced prices and lower returns. Even if plants are not totally destroyed, a freeze may retard development of the flowers and fruit which may disrupt marketing plans. These factors have slowed the expansion of tomato production in southwest Florida since the 1980/81 production season.

The Palmetto-Ruskin (Manatee-Hillsborough) area experienced consistent rapid expansion between 1977/78 to 1983/84 with the exception of the 1978/79 season. Tomato production increased from a low of 12,650 acres in the 1978/79 production season to a high of 17,540 acres harvested during the 1983/84 season. Production in the Palmetto-Ruskin area begins late in the winter season (March or April) when the frost risk is low.

Area harvested of ground-grown tomatoes showed no significant increase between 1977/78 and 1983/84, while harvested area of staked tomatoes increased yearly over the same period. The increase in acreage of staked tomatoes may reflect the expansion of production in the Palmetto-Ruskin area, a major source of staked tomatoes in Florida.

Tomatoes in Sinaloa

Sinaloan tomato producers produce for both national and export markets. The domestic market may be used as a secondary or refuge market as well, or as a residual market for nonexportable sizes and quantities. Most Sinaloan

Table 3—Florida ground and staked tomatoes: Area harvested

County	Type	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
					Acres			
Dade	Ground	10,750	10,760	11,400	13,000	10,900	12,900	12,800
Collier/Hendry	Ground	780	570	1,510	1,960	1,125	1,620	1,110
Collier/Hendry 1/	Staked	7,945	8,810	8,500	9,700	8,465	7,860	8,625
Manatee/Hills	Staked	14,710	12,650	13,650	15,630	14,385	16,250	17,540
Palm Beach	Staked	2,185	2,425	2,425	2,285	1,920	2,430	3,150
Other	2/	5,130	5,585	4,715	3,725	3,705	4,540	4,375
Total	Ground	14,465	13,655	13,650	15,400	12,540	12,910	13,950
Total	Staked	27,035	27,145	28,550	30,900	27,960	32,690	33,650
State total		41,500	40,800	42,200	46,300	40,500	45,600	47,600

1/ Small amount of ground acreage included with Collier County's stake culture in 1977/78 and 1978/79.

2/ Includes both ground and stake culture acreage.

Source: (6).

producers ship tomatoes only if the export price exceeds export marketing costs. When prices are low, harvested tomatoes may be shipped to the domestic market, fed to livestock, or thrown away. On the other hand, high prices can divert production from the domestic market. Relaxation of quality restrictions during periods of high prices may result in shipment of lower quality tomatoes to the export market. Over 60 percent of production has been sold in the export market during recent years.

Area, Yield, Production, and Value

Tomato production in Sinaloa can be divided into periods of expansion and contraction. The period 1965/66 to 1972/73 was the first expansionary period with area increasing in every year except 1970/71. Area declined in the 1970/71 season, partially in response to the imposition of the marketing order requirements with regard to differentiated sizes for mature green and vine-ripe tomatoes. Subsequent repeal of the size requirements encouraged rapid expansion in 1971/72 and 1972/73. Peak production of staked and ground-grown tomatoes occurred in 1972/73 when an all-time high of 51,000 acres was planted. After the peak of 1972/73, plantings contracted dramatically, falling to 36,302 acres in 1973/74 and a low of 31,823 acres in 1974/75 (table 4 and fig. 6). The period of contraction continued through 1977/78; an exception being the 1976/77 season when tomato area responded to the first devaluation of the peso. Producers expanded area planted during 1978/79 and 1979/80, reaching a peak of 43,534 acres in 1979/80. This expansion can be attributed to political factors and weather. Growers relaxed the informal controls on production, allegedly in response to increased Florida area. In

Table 4—Sinaloa fresh tomatoes: Export area, yield, production, and value

Season	Planted	Export yield per acre		Export production	Export value per carton		Total export value
		Staked	Ground		Staked	Ground	
	Acres	Cartons 1/		Thousand cartons	Dollars		Thousand dollars
1973/74	36,302	591	158	17,928	5.17	6.61	94,544
1974/75	31,823	723	172	17,998	5.70	6.55	103,860
1975/76	32,056	870	148	21,215	4.86	5.11	103,350
1976/77	37,737	843	204	25,338	6.83	8.24	175,960
1977/78	33,590	937	226	25,686	6.00	7.16	156,260
1978/79	42,074	670	168	23,517	6.93	7.69	164,230
1979/80	43,534	640	83	22,273	4.72	3.91	104,440
1980/81	33,286	634	126	15,640	12.25	13.69	193,480
1981/82	31,485	700	85	15,907	7.29	7.29	115,860
1982/83	35,879	670	132	18,507	8.66	10.60	162,850
1983/84	37,840	617	287	20,505	7.28	7.11	148,880

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weights for staked and ground tomatoes are 26.3 and 30 pounds, respectively.

Source: (4).

addition, devaluation of the peso increased the peso price of the dollar-denominated vegetable prices. Finally, unfavorable weather during the 1976/77 and 1977/78 production seasons reduced Florida production which, in turn, caused an increase in prices to Mexican growers.

The contraction of area planted to 33,286 acres in 1980/81 and 31,485 acres in 1981/82 was as dramatic as the expansion of the early 1970s. The 1979/80 production season was disastrous for Mexican producers because of low vegetable prices. Prices were favorable during the following season, but high inflation rates and the overvalued peso kept producer prices from increasing as much as had the dollar-denominated export prices. The peso became more overvalued in 1981/82 and area declined even further. Area expanded again in 1982/83 and 1983/84, reaching almost 38,000 acres in 1983/84.

Sinaloan plantings trended slightly upward over the 1973/74 to 1983/84 period, but also exhibited more season-to-season variation than area planted in Florida (fig. 13). Yields of tomatoes reflect weather and market conditions in the export and domestic market in the short run, and technological change in the long run. Reflecting the shortrun factors, export yield of staked or vine-ripe tomatoes varied from a low of 591 cartons per acre in 1973/74 to a peak of 937 cartons per acre in 1977/78 (table 4). Export yield of ground-grown tomatoes was significantly less than that of staked tomatoes, usually only 25 percent of staked tomato yield, and relatively more variable. The longrun trend of staked tomato export yields slightly decreased, while that of ground-grown tomatoes remained about even (figs. 14 and 15). The marginal decrease in the trend value of staked tomato yields may be explained, at least partially, by: (1) the lack of significant technological innovations, (2) increased production in Florida and Baja California which has limited market opportunities for Sinaloan producers, (3) occasional overvaluation of the

Figure 13
Trend in Tomato Area Planted, Sinaloa

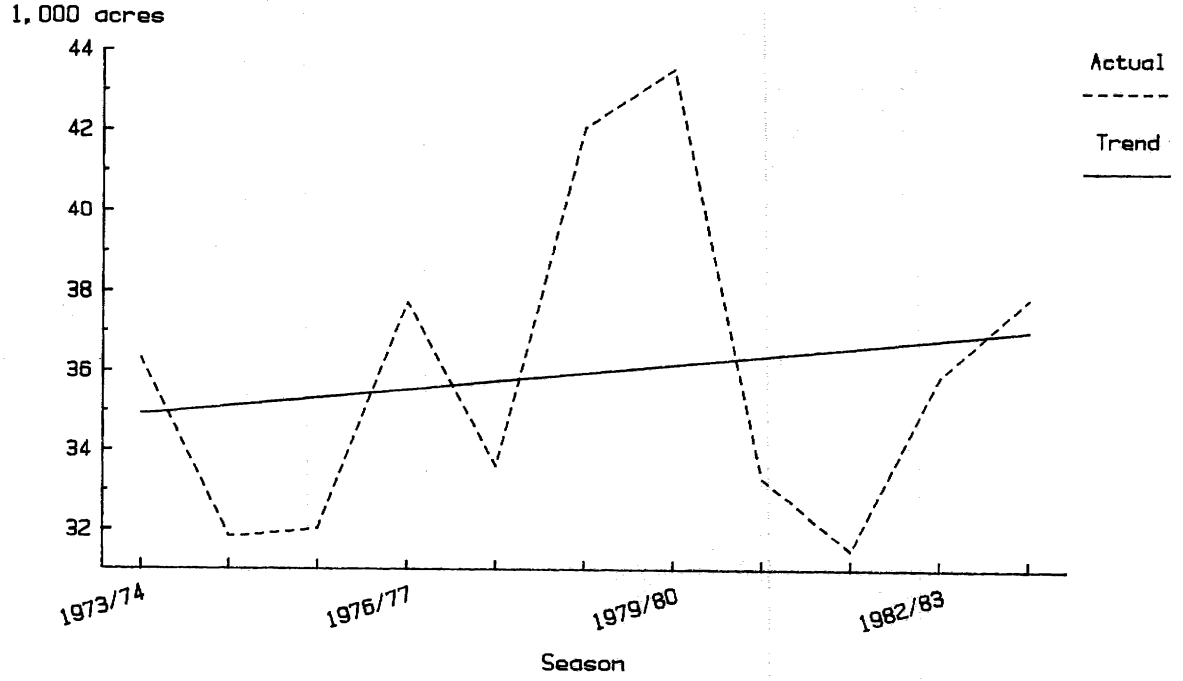


Figure 14
Trend in Staked Tomato Yields, Sinaloa

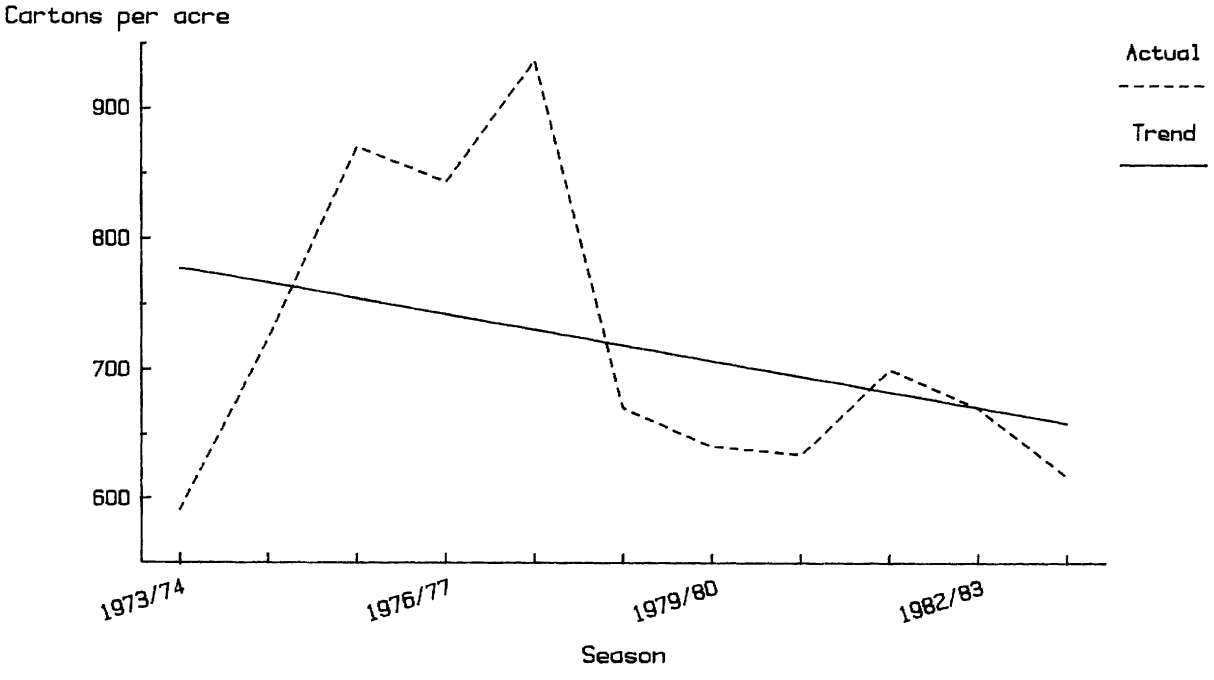
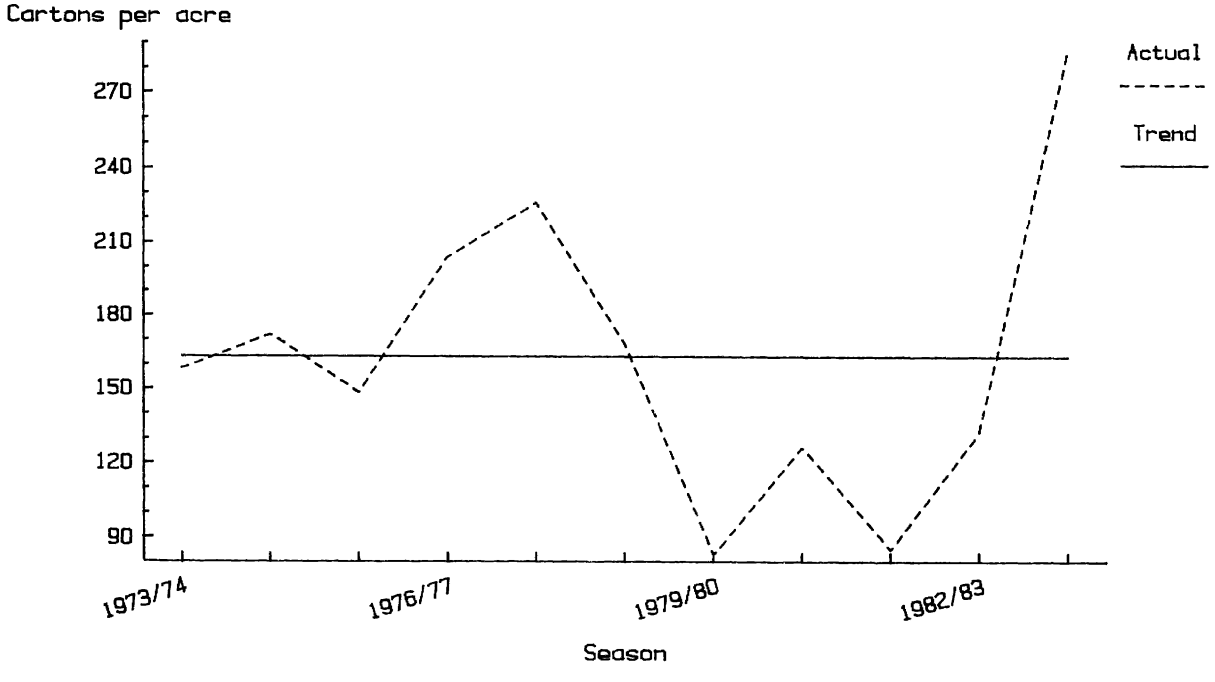


Figure 15
Trend in Ground Tomato Yields, Sinaloa



peso, and (4) the pattern of export prices, influenced by the exchange rate, unfavorable to tomato production during recent years.

The variability in yields of ground-grown tomatoes is relatively higher than yield variability of staked tomatoes. This variation reflects the usually large proportion of ground-grown production marketed in national markets. If export prices are favorable, some of that production may be diverted from the national market to the export market. Export yields are sensitive to prices existing in the latter months of the marketing year. Because a significant proportion of ground-grown tomatoes are grown to be marketed during these months, yields can expand if prices are high. However, since the mid-1970s, Mexican tomato producers have shown limited ability or willingness to respond to high export market prices with increased export marketings diverted from national markets. For example, low export prices experienced during the 1979/80 season did not increase sales on a per-acre basis to the national market. Moreover, the high export prices of the 1980/81 season did not appear to affect yields targeted for the national market.

The level of export prices for staked or vine-ripe tomatoes and for ground-grown tomatoes has increased; so too has the season-to-season price variability. Two years stand out: 1979/80 and 1980/81 (table 4). Export prices in 1979/80 were the lowest in several years which, when coupled with the overvalued peso, resulted in one of the least profitable years ever for Sinaloan vegetable producers. During 1980/81, export prices increased to unprecedented levels as unfavorable weather reduced production in both Sinaloa and Florida even though the peso remained overvalued.

In contrast to Mexican export prices, the season average price for Florida tomatoes varied little since 1975/76. The contrast in prices is partially explained by differences in the seasonal pattern of production in Mexico and Florida. Florida production has tended to move later in the marketing year when weather risks are less. Conversely, Sinaloan production has tended to concentrate in those months when weather frequently disrupts production in both areas and increases the risk of price variability.

Sinaloa ships tomatoes for export primarily during February, March, and April (table 5). Depending on weather conditions, significant shipments may commence in January or run as late as May.

Production Area

Three Sinaloa areas produce tomatoes (see fig. 2). Almost 90 percent of Mexican tomatoes exported to the United States during the 1983/84 production season were vine-ripes. Vine-ripe tomatoes are produced primarily in Culiacan, Sinaloa's largest tomato producing area. The Guasave and Los Mochis areas produce approximately half vine-ripe and half mature green tomatoes for export.

Peppers in Florida

The temperature sensitivity of bell peppers increases weather risk for Florida producers. Even though Florida producers experienced severe losses during each of the recent freezes, Florida bell pepper production has expanded.

Area, Yield, Production, and Value

Bell pepper area, yield, and production also increased in Florida during the last 10 years (table 6 and figs. 5 and 7). Harvested acres increased yearly

from a low of 13,400 acres in 1973/74 to a high of 20,700 acres in 1983/84, a 54-percent increase. Total production increased 52 percent over the same period. Increased total production is attributable to the increase in acreage harvested. Yields were highly variable due to the temperature sensitivity of the crop. Bell pepper production was severely damaged during each of the recent freezes, thereby reducing any potential for increased yields.

The average unit value received for peppers increased from $4.90 per bushel in the 1973/74 season to a high of $9.45 per bushel in the 1982/83 season. Total value increased from $31 million to almost $90 million over the same period. Although production increased in the 1983/84 season over 1982/83 levels, lower prices reduced total value to $74.8 million for the 1983/84 season.

Table 5—Sinaloa tomatoes: Monthly shipments, export and Mexican domestic markets

Season	December	January	February	March	April	May	June	Total
Export:				Metric tons				
1970/71	6,022	18,198	52,489	55,646	54,958	26,976	3,537	217,826
1971/72	3,959	35,269	57,044	72,972	65,842	42,645	8,304	286,035
1972/73	6,818	36,779	43,794	52,810	41,241	32,524	7,887	221,853
1973/74	1,479	18,661	31,592	50,053	47,543	38,512	18,501	206,341
1974/75	13,086	49,153	56,406	56,819	52,455	34,026	10,552	272,497
1975/76	10,012	40,383	60,805	79,286	81,134	36,371	8,848	316,839
1976/77	5,198	50,381	60,578	94,411	68,001	32,097	6,338	317,004
1977/78	6,856	44,808	65,557	68,273	52,985	33,943	5,397	277,819
1978/79	699	38,266	58,349	65,786	70,087	23,482	3,455	260,124
1979/80	65	11,479	48,092	66,841	50,495	9,410	384	186,766
1980/81	1,364	27,672	60,521	62,027	26,434	9,820	1,971	189,809
1981/82	3,585	35,978	36,206	67,392	60,529	27,100	1,391	232,181
1982/83	4,921	42,664	73,620	75,826	39,428	11,611	448	248,519
Mexican domestic:								
1971/72	0	10,116	25,391	29,723	33,571	29,385	7,501	135,687
1972/73	3,776	13,125	15,387	29,759	26,647	21,379	6,324	116,397
1973/74	875	7,950	15,548	31,877	32,736	28,595	6,764	124,345
1974/75	3,828	16,311	23,587	30,498	40,697	22,335	18,181	155,437
1975/76	2,356	11,968	30,511	33,061	31,840	22,144	8,072	139,952
1976/77	5,225	20,340	31,299	38,822	25,855	22,605	6,863	151,009
1977/78	2,851	15,563	25,161	33,389	25,740	23,812	4,455	130,971
1978/79	0	15,482	33,253	35,765	35,776	36,379	4,806	161,461
1979/80	0	11,118	22,859	25,637	30,748	20,962	9,559	120,883
1980/81	0	7,746	18,672	32,453	37,983	31,685	7,850	136,389
1981/82	0	17,747	21,876	37,266	45,559	22,982	0	145,430
1982/83	0	18,501	29,194	32,407	35,167	39,894	0	155,165

Source: (4).

Production Area

Bell peppers are grown in several areas of Florida, but the major areas of production are the southeast coast (Broward and Palm Beach counties) and southwest Florida (Hendry, Lee, and Charlotte counties) (table 7). The southeast coast has increased its share of bell pepper production in the last 7 years from a low of 2,730 acres harvested in 1979/80 to 6,800 harvested acres in 1983/84. Production in the southwest area decreased from 11,180 acres harvested in 1977/78 to 6,450 acres harvested in 1983/84. Recent freezes in Florida were the major cause for the production shift. These freezes were particularly hard on the southwest production area, resulting in a decrease in area planted to peppers. However, the decrease experienced in

Table 6—Florida bell peppers: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per bushel	Total value
	Planted	Harvested				
	--- Acres ---		Bushels 1/	Thousand bushels	Dollars	Thousand dollars
1973/74	14,100	13,400	473	6,336	4.90	31,034
1974/75	15,600	14,900	510	7,604	4.96	37,695
1975/76	16,800	15,900	454	7,220	5.45	39,326
1976/77	21,100	16,800	400	6,720	5.66	38,054
1977/78	20,400	18,800	434	8,164	5.17	42,188
1978/79	19,800	18,100	445	8,056	6.13	49,413
1979/80	18,800	17,300	414	7,156	7.13	51,035
1980/81	20,400	18,300	435	7,968	8.10	64,516
1981/82	21,500	19,300	412	7,944	7.00	55,592
1982/83	21,400	19,700	482	9,492	9.45	89,687
1983/84	23,000	20,700	467	9,660	7.75	74,833

1/ Net weight approximately 25 pounds.

Source: (6).

Table 7—Florida bell peppers: Area harvested

County	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
	Acres						
Broward/Palm Beach (southeast)	3,150	2,790	2,730	3,680	4,330	5,850	6,800
Collier/Hendry/Lee/Charlotte (southwest)	11,180	9,730	8,320	8,110	8,020	7,350	6,450
Other	4,470	5,580	6,250	6,510	6,950	6,500	7,450
State total	18,800	18,100	17,300	18,300	19,700	19,700	20,700

Source: (6).

southwest Florida was more than offset by an increase in production in southeast Florida.

Peppers in Sinaloa

The upward trend in area, yield, and export prices for bell peppers in Sinaloa suggests a greater increase in profitability than was true for tomato production. The increase in bell pepper production as well as increased production of cucumbers, squash, and, to a lesser extent, green beans and eggplant, is related to the stagnation of tomato production and the shifting of resources to the production of other vegetables.

Area, Yield, Production, and Value

The expansion of pepper production in Sinaloa has been dramatic. Area planted to peppers reached a historic high of 13,518 acres in the 1983/84 production season, a 46-percent increase over 1973/74 plantings (table 8 and figs. 6 and 8). The upward trend in yields is attributable mostly to increased use of production inputs and the use of staked production technology. Decreased yields in the 1982/83 and the 1983/84 seasons were the result of unfavorable growing conditions.

Export prices have been variable. Relatively higher prices were experienced during the 1976/77 and 1980/81 seasons when freezes hit Florida, increasing

Table 8—Sinaloa bell peppers: Export area, yield, production, and value

Season	Planted	Export yield per acre	Export production	Export value per carton	Total export value
	Acres	Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	9,245	323	2,986	5.37	16,034
1974/75	4,140	330	1,366	9.86	13,469
1975/76	6,494	350	2,272	8.58	19,494
1976/77	5,553	549	3,048	12.44	37,917
1977/78	9,067	427	3,871	7.80	30,194
1978/79	11,765	315	3,705	8.37	31,011
1979/80	10,522	500	5,261	8.21	43,193
1980/81	6,795	414	2,813	20.19	56,794
1981/82	6,602	637	4,205	11.98	50,376
1982/83	9,016	327	2,948	17.28	50,941
1983/84	13,518	335	4,528	10.98	49,717

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weight for bell peppers is 29.7 pounds.

Source: (4).

demand for Mexican peppers. Low prices in 1977/78 and 1979/80 may have been caused by overexpansion of production due to the high prices of 1976/77.

Sinaloa exports its largest volume of bell peppers during January, February, and March (table 9). Weather and disease problems prevent significant production early and late in the season.

Cucumbers in Florida

Similar to bell pepper producers, Florida cucumber producers are also subject to increased weather risk. However, most of the Florida cucumber crop is produced during the spring and fall when weather risk is lowest.

Area, Yield, Production, and Value

Florida cucumber production increased during the last 10 seasons (table 10 and figs. 5 and 7). Acreage planted and harvested remained fairly steady over the period; however, yields increased from a low of 202 bushels per acre in the 1973/74 season to a high of 316 bushels per acre in the 1982/83 season, a 53-percent increase. Total production increased from 2.62 million bushels in 1973/74 to 4.7 million bushels in 1982/83.

The average unit value received for cucumbers in Florida increased from a low of $4.17 per bushel in the 1975/76 season to a high of $8.85 in the 1980/81 season. Total value increased from a low of $14.6 million in the 1973/74 season to a high of $36.8 million in the 1982/83 season.

Production Area

The majority of cucumbers grown in Florida originates in the southwest region (Collier, Hendry, and Lee counties). A smaller proportion is grown in the west central area (Plant City and Wauchula).

Table 9—Sinaloa bell peppers: Monthly exports

Season	December	January	February	March	April	May	June	Total
				Metric tons				
1969/70	214.0	612.0	687.0	537.0	261.0	60.0	0	2,372.0
1970/71	97.0	430.0	572.0	429.0	144.0	18.0	0	1,690.0
1971/72	90.0	599.0	818.0	702.0	349.0	27.0	0	2,585.0
1972/73	337.0	801.0	849.0	648.0	180.0	20.0	0	2,835.2
1973/74	68.5	267.4	449.0	338.7	207.0	34.6	0	1,365.2
1974/75	263.7	689.4	739.9	427.2	144.5	0	0	2,264.7
1975/76	236.3	667.6	895.2	829.5	320.0	79.0	0	3,027.6
1976/77	287.2	872.0	1,153.0	980.0	532.7	30.7	0	3,855.6
1977/78	406.4	866.2	1,018.8	845.6	373.7	133.2	.8	3,644.7
1978/79	528.5	1,247.2	1,382.3	1,356.3	806.4	140.4	9.7	5,470.8
1979/80	282.4	774.7	699.2	804.0	227.1	22.2	0	2,809.6
1980/81	446.8	1,119.9	1,169.5	933.2	390.0	148.6	0	4,208.0
1981/82	368.3	388.4	422.5	1,059.6	562.8	145.4	.9	2,948.0
1982/83	575.1	1,135.0	1,082.5	1,366.0	297.5	65.3	0	4,521.3

Source: (4).

Cucumbers in Sinaloa

Cucumber production for export is second only to tomato production in importance to Sinaloan producers.

Area, Yield, Production, and Value

Area planted in cucumbers increased in Sinaloa over the 1973/74 to 1983/84 production seasons (table 11 and fig. 6). After increasing during the mid-1970s, cucumber area gradually contracted by 71 percent between 1978/79 and 1981/82. Area planted again expanded in the past two seasons and reached a record high level of 20,059 acres in 1983/84. Since the early 1970s, area tended to expand in one year and contract in the following year.

Cucumber export yields expanded more rapidly than those of bell peppers (fig. 8). However, as with bell peppers, export yields fell in the most recent two seasons.

The upward trend in export price for cucumbers is much less pronounced than that for tomatoes or bell peppers. Price extremes coincide with the price extremes of the other vegetables with the exception of the high 1974/75 cucumber price and the decline in prices of the other vegetables during the 1981/82 season.

Sinaloan producers ship most cucumbers for the export market in December, January, and February (table 12). Significant export shipments may occur through March depending on weather conditions.

Table 10—Florida fresh cucumbers: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per bushel	Total value
	Planted	Harvested				
	--- Acres ---		Bushels 1/	Thousand bushels	Dollars	Thousand dollars
1973/74	14,100	13,000	202	2,624	5.58	14,643
1974/75	15,000	14,600	241	3,513	5.24	18,404
1975/76	16,000	15,400	246	3,791	4.17	15,806
1976/77	16,100	15,000	221	3,318	5.95	19,726
1977/78	16,500	15,000	259	3,884	5.77	22,398
1978/79	16,600	15,700	268	4,209	7.64	32,050
1979/80	15,400	14,500	280	4,056	8.67	35,168
1980/81	15,800	14,900	273	4,072	8.85	36,054
1981/82	16,100	15,300	308	4,707	7.00	32,970
1982/83	15,900	15,000	316	4,742	7.77	36,851
1983/84	16,000	15,100	307	4,635	7.33	33,971

1/ Net weight approximately 55 pounds.

Source: (6).

Table 11—Sinaloa fresh cucumbers: Export area, yield, production, and value

Season	Planted	Export yield per acre	Export production	Export value per carton	Total export value
	Acres	Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	12,098	262	3,176	5.57	17,690
1974/75	5,422	346	1,877	9.95	18,676
1975/76	7,188	482	3,462	8.60	29,773
1976/77	8,168	502	4,104	10.59	43,461
1977/78	8,971	559	5,019	9.57	48,032
1978/79	13,242	382	5,065	9.31	47,155
1979/80	11,434	540	6,177	8.56	52,875
1980/81	10,497	481	7,495	12.30	92,189
1981/82	7,756	535	4,150	13.74	57,021
1982/83	13,834	320	4,436	16.31	72,351
1983/84	20,059	207	4,164	13.12	54,632

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weight for fresh cucumbers is 44.6 pounds.

Source: (4).

Table 12—Sinaloa cucumbers: Monthly exports

Season	December	January	February	March	April	May	June	Total
	Metric tons							
1973/74	255.2	537.2	474.8	243.1	231.9	65.5	0	1,807.7
1974/75	684.2	956.9	810.3	680.6	232.6	11.9	0	3,376.5
1975/76	808.8	1,205.2	915.1	704.7	269.1	22.6	2.0	3,927.5
1976/77	1,184.2	1,324.8	1,010.8	868.8	295.5	14.1	0	4,698.2
1977/78	905.3	1,349.1	1,241.6	1,106.2	339.5	19.5	0	4,961.2
1978/79	959.8	1,610.2	1,623.3	1,428.6	370.7	14.4	.2	6,007.2
1979/80	919.2	1,204.2	1,214.5	1,192.5	333.5	19.7	0	4,883.6
1980/81	892.5	874.0	840.3	814.9	399.5	42.7	0	3,863.9
1981/82	736.4	1,030.9	965.2	884.6	540.7	35.4	.4	4,193.7
1982/83	1,183.9	916.3	729.3	914.1	376.1	44.2	0	4,163.8

Source: (4).

Green Beans in Florida

Green bean production in Florida only moderately increased since the 1973/74 season. This resulted in a drop in the percentage contribution of green beans to total Florida vegetable crop value from 5.4 percent in 1973/74 to 3.8 percent in 1983/84 (6).

Area, Yield, Production, and Value

Green bean production in Florida expanded in terms of area planted and value during the last 10 seasons (table 13 and fig. 5). Planted acres increased from a low of 36,500 in the 1974/75 season to a high of 50,400 in 1981/82. Yields, however, decreased from a high of 125 bushels per acre achieved in the 1976/77 season to a low of 82 bushels in 1981/82 (fig. 7). The decrease in yields is due predominantly to more widespread use of a new machine-harvesting technology. While providing cost advantages over hand-harvesting practices, the machine harvester permits only one picking. However, hand harvesting results in higher yields of a higher quality product. Hand harvesting is done when prices are adequate to cover the additional cost.

Total production of green beans in Florida remained fairly steady over the last 10 seasons, ranging from 3.47 million bushels in 1980/81 to 4.45 million bushels in 1975/76. The average unit value received increased from $5.52 per bushel in the 1973/74 season to a high of $10.60 per bushel in the 1982/83 season. Total value increased from $20.7 million to $44 million in the same period, due mostly to the increased price per bushel.

Table 13—Florida green beans: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per bushel	Total value
	Planted	Harvested				
	--- Acres ---		Bushels 1/	Thousand bushels	Dollars	Thousand dollars
1973/74	39,800	36,900	102	3,757	5.52	20,728
1974/75	36,500	35,300	120	4,243	6.14	26,038
1975/76	38,900	37,500	119	4,453	5.74	25,560
1976/77	39,600	29,500	125	3,680	6.29	23,136
1977/78	40,500	39,000	101	3,957	8.06	31,889
1978/79	45,700	40,600	102	4,140	7.58	31,386
1979/80	48,900	47,000	89	4,173	8.11	33,861
1980/81	49,100	41,100	85	3,473	10.39	36,089
1981/82	50,400	46,300	82	3,786	10.33	39,112
1982/83	48,700	46,400	90	4,154	10.60	44,041
1983/84	46,200	44,000	96	4,210	9.22	38,824

1/ Net weight approximately 30 pounds.

Source: (6).

Production Area

Green beans are grown in several areas in Florida, but mostly in the southeast counties of Dade, Broward, and Palm Beach (table 14). A shift in production in the southeast occurred in the last 7 years. Production in the Dade County area expanded dramatically from 3,500 harvested acres in the 1977/78 season to 18,000 harvested acres in 1983/84. In contrast, acres harvested in the Palm Beach and Broward County area decreased from 25,200 in the 1977/78 season to 15,800 in 1983/84. The dramatic changes in area planted in Dade County and in the Palm Beach area may be attributed to changes in the cost structure of the crop as explained in the "Production Practices and Costs" section.

Green Beans in Sinaloa

Sinaloan production of green beans for export remained negligible until the 1974/75 production season. While increasing in importance, green beans made the smallest contribution to total fresh winter vegetable export value in Sinaloa during 1984/85.

Area, Yield, Production, and Value

Planted acres of green beans in Sinaloa also trended upward (table 15 and fig. 6). Area planted increased from 1,771 acres in the 1974/75 season to 4,762 acres in the 1983/84 season. Similar to the area of other vegetables in this analysis, area planted to green beans contracted slightly during the mid-1970s and then expanded in the early 1980s.

Yields significantly decreased between the 1976/77 season and the 1983/84 season (fig. 8). A low of 112 cartons per acre was obtained in 1980/81. The 1976/77 season produced 235 cartons, but yields in 1983/84 fell 88 percent to 125 cartons per acre.

Export value data for Sinaloan green beans were not available for the period analyzed. The value per bushel figures reported in table 15 are Florida green bean prices used as a proxy to obtain an estimated total export value for Mexican green beans for each of the production seasons.

Table 14—Florida pole and bush beans: Area harvested

County	Type	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84
					Acres			
Dade	Bush	3,500	4,150	7,000	10,000	13,800	17,400	18,000
Dade	Pole	3,780	3,250	2,750	2,500	2,500	2,600	3,100
Palm Beach/Broward	Bush	25,200	25,500	28,750	21,500	20,700	18,700	15,800
Other	1/	6,550	7,700	8,500	7,100	9,300	7,700	7,100
State total		39,000	40,600	47,000	41,100	46,300	46,400	44,000

1/ Includes acreage from western Palm Beach County.

Source: (6).

Most Sinaloan green beans exported are shipped during December, January, and February (table 16). Significant shipments may last through March depending on weather conditions.

Squash in Florida

Yellow squash production has steadily increased in importance to Florida growers since the 1973/74 season. During 1983/84, squash contributed 2.8 percent to total vegetable crop value in Florida (6).

Area, Yield, Production, and Value

Yellow squash production in Florida more than doubled during the last 10 years due to increased area harvested and improved yields (table 17 and figs. 5 and 7). Harvested acres of squash increased 66 percent between 1973/74 and 1983/84. A record high of 16,800 acres harvested was achieved in the 1983/84 season. Yields also increased from 143 bushels per acre in 1977/78 to a high of 179 bushels per acre in 1982/83. Total production increased from 1.46 million bushels in the 1973/74 season to 2.98 million bushels in the 1983/84 season.

Production Area

Squash are predominantly produced in the southwest (Lee and Hendry counties) and the southeast regions (Palm Beach and Dade counties). Some production

Table 15—Sinaloa green beans: Export area, yield, production, and value

Season	Planted	Export yield per acre	Export production	Export value per carton 2/	Total export value
	Acres	Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	NA	NA	NA	NA	NA
1974/75	1,771	165	292	6.14	1,793
1975/76	2,028	172	348	5.74	1,998
1976/77	1,776	235	417	6.29	2,623
1977/78	3,011	188	567	8.06	4,570
1978/79	3,927	200	784	7.58	5,943
1979/80	4,130	189	783	8.11	6,350
1980/81	3,557	112	399	10.39	4,145
1981/82	2,275	170	388	10.33	4,008
1982/83	3,500	157	551	10.60	5,840
1983/84	4,762	125	595	9.22	5,486

NA denotes not available.

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weight for bush beans is 30 pounds.

2/ Export value data were unavailable for Mexican bush beans. Florida bush bean prices were used as a proxy for Mexican prices.

Source: (4).

also occurs in the west central region, specifically in the Plant City area. No significant shifts in production area occurred in the past few years.

Squash in Sinaloa

Unlike Florida growers who grow yellow squash during the winter season, Sinaloan producers grow zucchini squash for export to the United States.

Table 16—Sinaloa green beans: Monthly exports

Season	December	January	February	March	April	May	June	Total
	Metric tons							
1973/74	47.0	60.0	94.1	70.1	19.1	1.0	0	290.0
1974/75	121.0	102.0	59.0	31.0	28.0	1.0	0	342.0
1975/76	114.0	125.0	55.0	56.0	59.0	3.0	0	414.0
1976/77	128.0	123.0	129.0	117.0	42.0	16.0	2.0	557.0
1977/78	164.0	183.0	142.0	157.0	102.0	16.0	3.0	768.7
1978/79	106.0	208.0	200.0	189.0	68.0	1.0	0	773.0
1979/80	57.0	129.0	141.0	42.0	27.0	0	0	395.0
1980/81	1.0	98.0	70.0	82.0	34.0	1.0	1.0	286.0
1981/82	120.0	106.0	82.0	164.0	63.0	13.0	1.0	549.0
1982/83	106.0	188.0	113.0	120.0	60.0	6.0	0	594.0

Source: (4).

Table 17—Florida squash: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per bushel	Total value
	Planted	Harvested				
	- - - Acres - - -		Bushels 1/	Thousand bushels	Dollars	Thousand dollars
1973/74	10,900	10,100	145	1,463	5.78	8,459
1974/75	11,800	11,200	160	1,792	6.14	10,997
1975/76	11,900	11,400	154	1,761	6.53	11,508
1976/77	12,600	12,000	158	1,893	5.89	11,156
1977/78	12,350	11,850	143	1,693	4.28	7,253
1978/79	13,850	13,350	139	1,860	7.51	13,971
1979/80	14,000	13,500	174	2,350	9.30	21,855
1980/81	15,600	14,800	159	2,357	9.72	22,904
1981/82	17,400	16,600	168	2,788	9.69	27,029
1982/83	16,700	16,100	179	2,874	11.12	31,949
1983/84	17,700	16,800	177	2,981	10.12	30,173

1/ Net weight approximately 42 pounds.

Source: (6).

Area, Yield, Production, and Value

Sinaloan producers increased area planted to zucchini squash from 3,816 acres in 1973/74 to a high of 9,801 acres in the 1983/84 production season (table 18 and fig. 6). Yields improved until 1976/77, but steadily declined since that time (fig. 8). However, increased area planted has tended to offset the effects of lower yields.

Export prices for squash trended sharply upward throughout the study period despite large increases in export production. The pattern of prices is consistent with an expansion of demand that exceeds the expansion of supply. The expansion of production is consistent with sustained profitability and the shifting of resources into squash production in Sinaloa.

Sinaloan producers export squash between December and March. Most production has been exported during January and February (table 19).

Eggplant in Florida

Of the six vegetables considered in this study, eggplant is the smallest contributor to total Florida vegetable crop value.

Area, Yield, Production, and Value

Eggplant showed the least absolute increase in harvested acres over the study period. Harvested acres ranged from a low of 1,800 acres in 1973/74 to a high of 2,800 acres in the 1978/79, 1979/80, and 1980/81 seasons (table 20 and figs. 5 and 7). Yields slightly improved during the last two production

Table 18—Sinaloa squash: Export area, yield, production, and value

Season	Planted	Export yield per acre	Export production	Export value per carton 2/	Total export value
	Acres	Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	3,816	291	1,110	5.48	6,083
1974/75	4,861	212	1,033	6.22	6,425
1975/76	4,078	287	1,173	6.00	7,038
1976/77	3,861	364	1,407	7.26	10,215
1977/78	4,807	332	1,598	7.15	11,426
1978/79	6,938	331	2,298	5.88	13,512
1979/80	7,521	304	2,292	7.22	16,548
1980/81	6,210	222	1,381	12.14	16,765
1981/82	6,985	263	1,838	9.03	16,597
1982/83	8,818	212	1,870	7.81	14,605
1983/84	9,801	154	1,516	7.27	11,021

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weight for squash is 29.3 pounds.

Source: (4).

seasons due to increased use of new eggplant varieties. A State average high yield of 710 bushels was achieved in the 1983/84 production season. However, freezes lowered average yields over the study period. Total eggplant production in Florida increased from 1.16 million bushels in the 1973/74 season to a high of 1.68 million bushels in the 1979/80 season.

Table 19—Sinaloa squash: Monthly exports

Season	December	January	February	March	April	May	June	Total
				Metric tons				
1973/74	108.0	280.0	312.6	241.1	50.9	30.7	2.5	1,025.8
1974/75	243.2	389.1	321.1	185.6	54.9	6.7	.5	1,201.1
1975/76	231.4	271.2	413.7	379.7	69.9	9.8	4.5	1,380.2
1976/77	266.6	438.3	486.0	309.5	36.6	3.1	2.6	1,542.7
1977/78	407.7	584.6	609.6	522.7	93.7	8.1	1.2	2,227.6
1978/79	449.7	609.6	728.1	410.9	51.2	4.7	1.9	2,256.1
1979/80	177.8	428.5	538.6	184.6	14.5	1.8	0	1,345.8
1980/81	265.4	616.8	638.3	274.7	31.3	6.9	4.0	1,837.4
1981/82	265.5	516.3	589.2	337.3	107.7	13.5	4.9	1,834.5
1982/83	231.9	387.4	431.0	366.6	87.3	11.9	0	1,516.0

Source: (4).

Table 20—Florida eggplant: Area, yield, production, and value

Season	Area		Yield per acre	Production	Value per bushel	Total value
	Planted	Harvested				
	--- Acres ---		Bushels 1/	Thousand bushels	Dollars	Thousand dollars
1973/74	1,850	1,800	643	1,158	3.62	4,189
1974/75	2,200	2,150	692	1,488	3.71	5,521
1975/76	2,400	2,300	688	1,582	3.06	4,841
1976/77	2,250	1,950	701	1,367	3.90	5,332
1977/78	2,400	2,250	660	1,485	3.80	5,636
1978/79	3,100	2,800	585	1,639	4.14	6,784
1979/80	3,100	2,800	600	1,679	4.36	7,328
1980/81	3,100	2,800	592	1,658	5.67	9,394
1981/82	2,640	2,530	657	1,661	5.76	9,568
1982/83	2,590	2,500	666	1,666	5.06	8,429
1983/84	2,300	2,100	710	1,491	5.84	8,713

1/ Net weight approximately 33 pounds.

Source: (6).

The average unit value received for eggplant increased from a low of $3.06 per bushel in 1975/76 to a high of $5.84 per bushel in the 1983/84 season. Total value of production increased from $4.19 million in the 1973/74 season to $9.57 million in the 1981/82 season.

Production Area

Eggplant production in Florida is centered in the southeast (Broward and Palm Beach counties). Small-scale production is also located in southwest Florida and in the central area of the State. No significant shifts in production area have occurred in recent years.

Eggplant in Sinaloa

Eggplant production in Sinaloa experienced moderate increases between the 1973/74 and 1983/84 production seasons. However, eggplant contribution to total Sinaloan export value of the six vegetables remained at only 2.8 percent during the two seasons.

Area, Yield, Production, and Value

Area planted in eggplant reached a record high of 2,764 acres in the 1973/74 production season only to significantly contract for the remainder of the decade, as did tomatoes, cucumbers, and bell peppers (table 21 and fig. 6). Since then, area planted has remained fairly stable. Production has expanded almost as rapidly as that of squash. Export production peaked in the 1979/80 season, but fell slightly during the last four production seasons. The correspondence of area and production is fairly close, indicating that yields

Table 21—Sinaloa eggplant: Export area, yield, production, and value

Season	Planted	Export yield per acre	Export production	Export value per carton	Total export value
	Acres	Cartons 1/	Thousand cartons	Dollars	Thousand dollars
1973/74	2,764	516	1,428	2.90	4,141
1974/75	1,317	798	1,052	4.38	4,608
1975/76	1,470	903	1,328	3.22	4,276
1976/77	1,045	1,259	1,316	5.65	7,435
1977/78	1,314	1,227	1,613	4.21	6,791
1978/79	1,680	836	1,406	5.26	7,396
1979/80	1,823	956	1,744	4.11	7,168
1980/81	1,400	889	1,245	6.69	8,329
1981/82	1,344	907	1,220	4.93	6,015
1982/83	1,783	809	1,443	7.49	10,808
1983/84	2,230	695	1,552	5.05	7,838

1/ Average box weights were calculated from the reported data for Sinaloa area, yield, and production. The average box weight for eggplant is 23.8 pounds.

Source: (4).

have not offset the variation in area planted since yields peaked at 1,259 cartons per acre in the 1976/77 season. Export value has remained low; the increase in planted acres in the 1983/84 season relative to the 1982/83 season was offset by reduced export prices thereby reducing total export value below the level obtained in 1982/83.

Significant eggplant exports from Sinaloa occur during December through March. March has historically been the most active month during most years (table 22).

Trends in Shipments

Changes in the competitive positions of Florida and Mexico in the winter fresh vegetable market may be assessed by comparing changes in the volume of shipments from both countries (tables 23 and 24).

Total shipments of winter fresh vegetables from Florida and Mexico increased significantly over the past 17 years. Mexican tomato shipments, which increased by 411 million pounds between the 1967/68 season and the 1983/84 season, account for the largest increase in total shipments in terms of absolute value. Florida tomato shipments substantially increased since the 1973/74 season. Florida tomato shipments increased 395 million pounds between the 1967/68 and 1983/84 seasons and accounted for 57 percent of all winter tomato shipments, and 29 percent of total winter fresh vegetable shipments, from both Florida and Mexico during the 1983/84 season. Almost 56 percent of all winter fresh vegetable shipments from both Florida and Mexico during 1983/84 consisted of tomatoes. Seasonal tomato shipments from Florida have surpassed those from Mexico since the 1978/79 season (fig. 16).

Mexican shipments of the other vegetables summarized in table 23 were less than Florida's in terms of total absolute shipments during the 1967/68 to 1983/84 period for all vegetables except cucumbers. However, the increase of Mexican shipments between 1967/68 and 1983/84 was greater than that of Florida. Mexican bell pepper and cucumber shipments increased 174 and 252

Table 22—Sinaloa eggplant: Monthly exports

Season	December	January	February	March	April	May	June	Total
				Metric tons				
1973/74	124.3	229.5	186.5	163.6	169.8	89.6	27.2	990.5
1974/75	192.3	273.2	203.3	292.9	149.7	91.7	12.2	1,215.3
1975/76	155.2	264.2	243.4	272.6	195.2	75.6	28.0	1,234.2
1976/77	208.6	318.4	302.5	301.7	241.6	121.2	42.0	1,536.0
1977/78	222.0	303.2	301.2	278.0	183.0	164.8	52.5	1,504.7
1978/79	229.5	309.1	314.5	413.1	230.1	92.4	12.5	1,601.2
1979/80	148.7	238.6	262.0	327.7	205.2	34.8	.8	1,217.8
1980/81	167.2	281.1	303.7	236.4	122.6	86.6	3.3	1,200.9
1981/82	180.2	224.0	254.0	327.4	259.6	111.0	13.0	1,369.2
1982/83	281.8	321.4	307.3	339.3	152.9	66.6	0	1,469.9

Source: (4).

Table 23—Fresh winter vegetables: Total recorded movement from Florida and Mexico 1/

Season	Tomatoes 2/		Bell peppers 3/		Cucumbers 3/		Eggplant 3/		Green beans 3/		Squash 3/	
	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Million pounds											
1967/68	663	402	157	22	220	58	24	9	113	7	51	8
1968/69	552	548	141	37	165	113	24	17	106	11	48	19
1969/70	417	710	73	55	153	129	18	23	67	12	38	24
1970/71	533	645	96	98	134	190	23	24	82	12	43	30
1971/72	589	641	120	79	178	164	26	29	84	16	46	26
1972/73	598	819	143	96	172	178	25	40	94	16	52	26
1973/74	599	664	138	110	160	181	30	34	84	16	50	29
1974/75	704	620	175	70	200	113	40	28	97	10	64	26
1975/76	758	671	158	75	223	187	39	33	103	12	65	34
1976/77	622	828	157	95	218	215	40	34	84	18	71	42
1977/78	722	855	177	149	233	255	41	43	84	22	66	61
1978/79	875	751	179	127	233	493	44	40	84	27	76	57
1979/80	990	697	157	133	208	304	45	46	87	27	114	140
1980/81	983	553	176	110	211	280	45	33	68	16	87	37
1981/82	1,057	582	178	166	244	262	46	34	78	16	106	103
1982/83	1,090	710	213	135	244	290	45	37	89	20	109	122
1983/84	1,058	813	217	196	242	310	39	40	91	22	114	140
1984/85	1,238	670	243	216	258	302	43	34	78	24	108	78
Total	14,048	12,179	2,898	1,969	3,696	4,024	637	578	1,572	304	1,308	1,002

1/ Data for Mexico show total recorded movement for all points of entry into the United States, including some vegetables transshipped across the United States to Canada.

2/ October through July.

3/ October through June.

Source: (5).

Table 24—Fresh winter vegetables: Change in total recorded movement from Florida and Mexico, between selected seasons

Season	Tomatoes		Bell peppers		Cucumbers		Eggplant		Green beans		Squash	
	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Million pounds											
1967/68 to 1983/84	395	411	60	174	22	252	15	31	-22	15	63	132
1967/68 to 1972/73	-65	417	-14	74	-48	120	1	31	-19	9	1	18
1972/73 to 1975/76	160	-148	15	-21	51	9	14	-7	9	-4	13	8
1977/78 to 1981/82	335	-273	1	17	10	7	5	-9	-6	-6	40	42
1975/76 to 1982/83	300	142	59	121	19	123	0	7	-12	10	49	106

Source: Calculated from table 23.

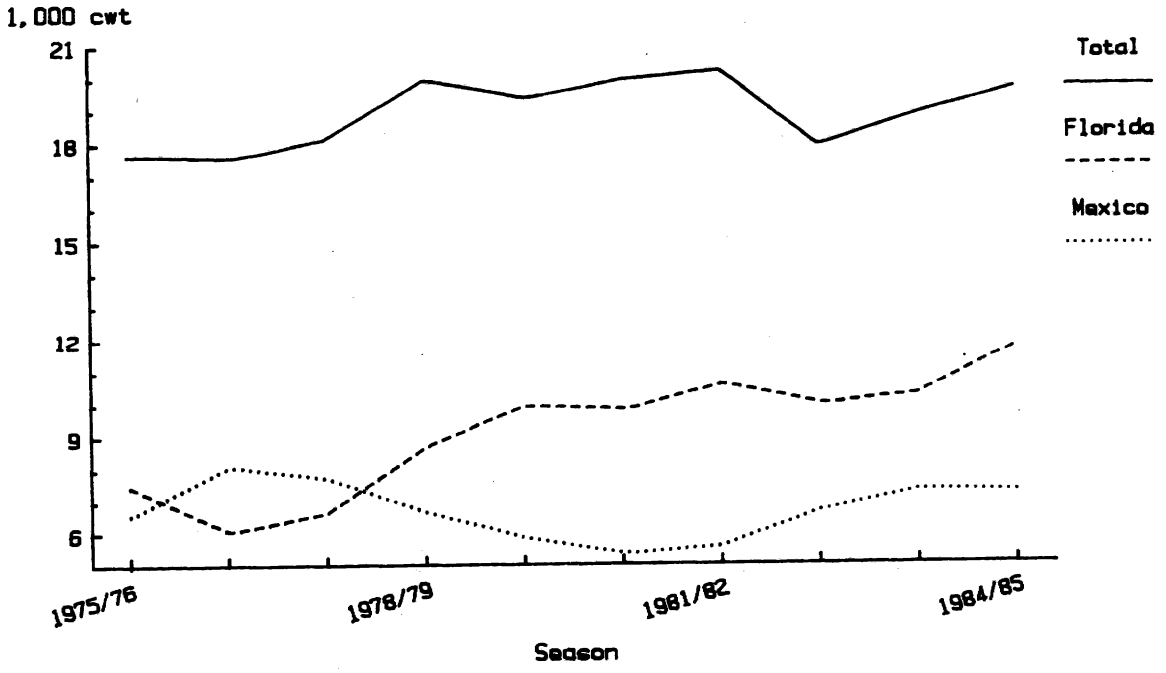
million pounds, respectively, between 1967/68 and 1983/84 while Florida bell pepper and cucumber shipments increased only 60 and 22 million pounds over the same period. Seasonal shipments of the other vegetables from Florida surpassed those from Mexico since 1975/76, except for the 1979/80 and 1984/85 production seasons (fig. 17).

Examination of longrun trends may hide short-term changes which may have significant impact and implications in the Florida and Mexican vegetable industries. Shortrun trends for the Florida and Mexican industries can be divided into three distinct periods: (1) 1967/68 to 1972/73, (2) 1972/73 to 1975/76, and (3) 1975/76 to 1983/84.

The 1967/68-1972/73 period represented a period of contraction for Florida and expansion for Mexican winter fresh vegetable production. Mexican producers expanded exports of all six vegetables while Florida shipments declined for all except eggplant and squash, both of which increased by only 1 million pounds each.

The situation reversed during the 1972/73-1975/76 period. Florida production continued on an upward trend which began in 1970/71, in contrast to Mexican production which tended to decline or to remain level during the same time. Florida tomato shipments increased by almost 27 percent between 1972/73 and 1975/76. Mexican tomato shipments declined 18 percent over the same period. Florida also gained in the shipments of other vegetables: bell pepper shipments increased by 15 million pounds, cucumbers by 51 million pounds, eggplant by 14 million pounds, green beans by 9 million pounds; and squash by 13 million pounds. Mexican gains and losses were sporadic for the same vegetables with only cucumbers providing modest gains.

Figure 16
Tomato Shipments to U.S. Markets, October-June



Source: (2).

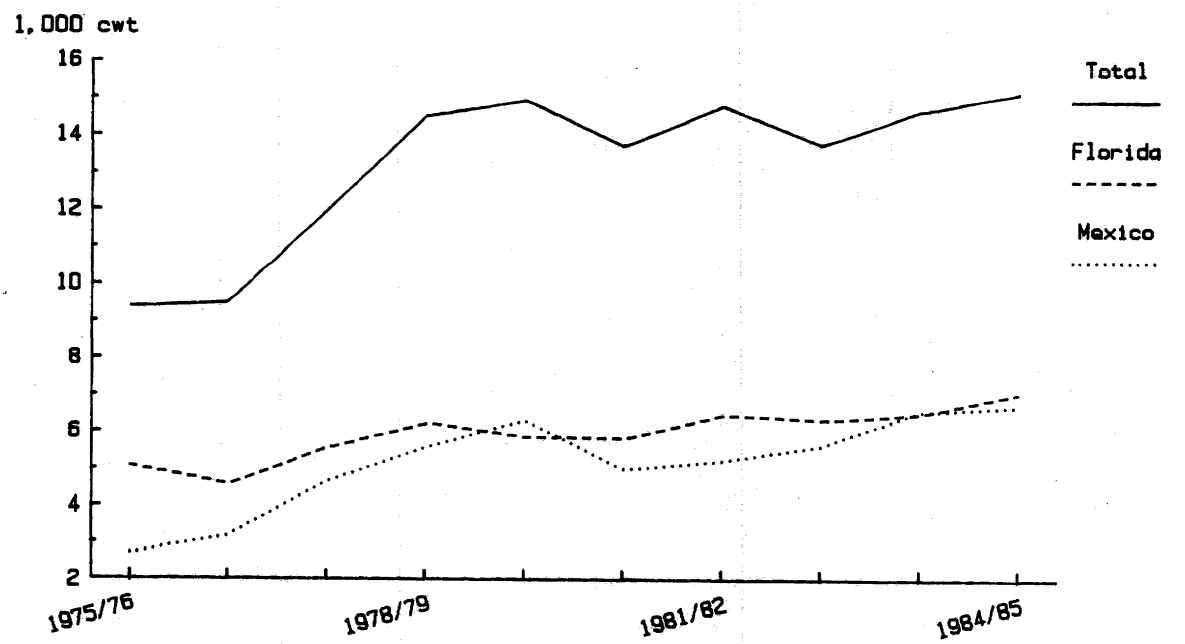
Florida and Mexican shipments were affected by nonmarket forces which had significant impact on both industries during the 1976/77 production season. The first devaluation of the Mexican peso occurred during 1976 which provided Mexican producers a temporary cost advantage over U.S. producers. Mexican export production of winter fresh vegetables expanded immediately, only to decline slightly or level off over the next two production seasons due to increasing input price inflation.

Florida vegetable production was devastated by freezing weather during January 1977. Florida tomato shipments dropped almost 20 percent from 1975/76 levels in addition to a 3-percent drop in shipments of other vegetables. In contrast, Mexican tomato shipments increased 23 percent. In addition, other vegetable shipments from Mexico increased 18 percent. The Florida industry rebounded in the 1977/78 season even though Mexican shipments remained high.

Florida producers have continued expanding since the 1977/78 season. Shipments reached record highs in the 1984/85 season for tomatoes, bell peppers, and cucumbers. Florida shipments of tomatoes, bell peppers, and green beans have far exceeded Mexican shipments of the same vegetables over the last four seasons. However, Mexican shipments, especially of cucumbers, remained strong. Mexican cucumber shipments reached record highs in 1984/85 and have exceeded Florida's shipments for the past eight production seasons.

Florida again was hit by freezing weather in January 1985, which significantly affected production of eggplant, green beans, bell peppers, and squash. Winter fresh vegetable shipments dropped 54 percent from the 42.4 million pounds recorded the week prior to the freeze, to 22.8 million pounds in late

Figure 17
Other Vegetable Shipments to U.S. Markets, October-June 1/



1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: (2).

March. Mexican winter fresh vegetable shipments increased 30 percent during this period, allowing Mexico to obtain a 76-percent share of the U.S. market between January and March (2).

Interseason trends are also important in assessing the competitive positions of Florida and Mexico. The heaviest competition between Florida and Mexico historically occurs in the December-April period, as the bulk of Florida's winter fresh produce is shipped from the southern-most areas during this time. Shipments during May and June indicate each area's relative importance when spring crop production is fully active in Florida and Mexican shipments to the United States are tapering off. Figures 18 and 19 illustrate Florida, Mexican, and total shipments to U.S. markets of tomatoes and other vegetables (bell peppers, cucumbers, squash, eggplant, and green beans), respectively, in December through April, since the 1975/76 season. Figures 20 and 21 illustrate the shipment patterns for the May and June period.

Mexican shipments of the other vegetables during December through April consistently surpassed Florida's since the 1976/77 season. However, Florida tomato shipments to U.S. markets increased during 1979/80 and surpassed those from Mexico during 1979/80 through 1982/83. This reflects the significant decrease in Sinaloan tomato area planted and yields illustrated in figures 13 and 14. The decrease in Florida tomato shipments during December through June over the past four seasons is attributable to freeze damage.

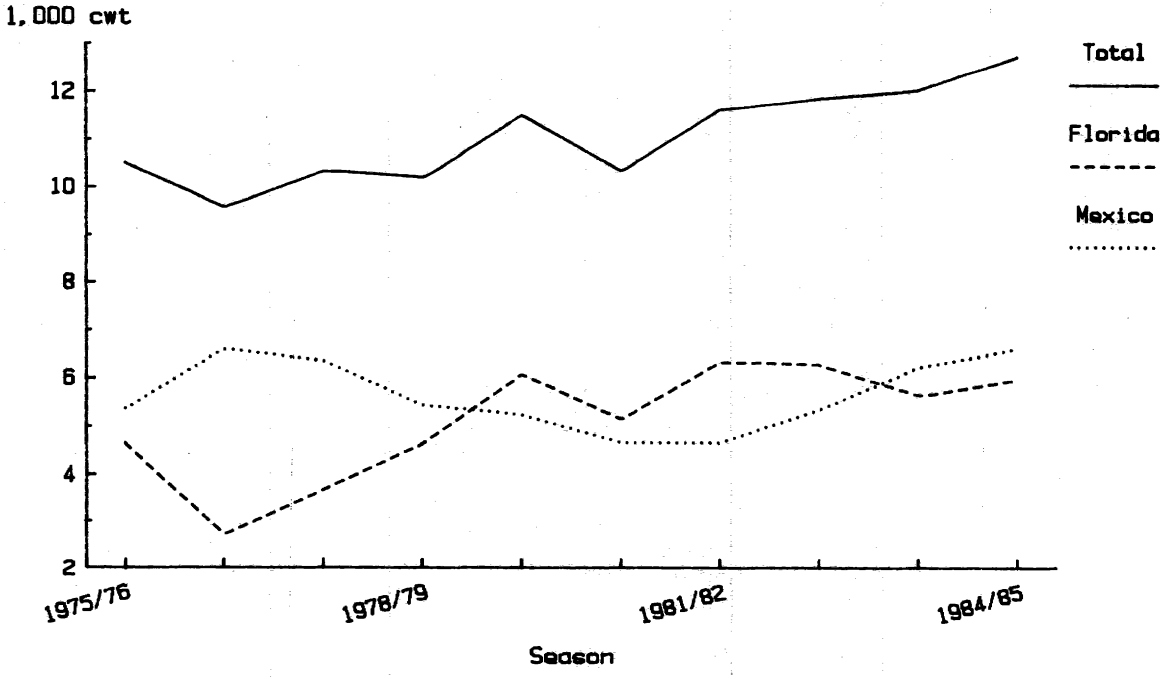
Fresh winter vegetable shipments to U.S. markets during May and June are clearly dominated by Florida. Heavy spring planting of tomatoes in Florida occurred during freeze years to help offset losses incurred earlier in the production season. Moreover, production area increases as the risk of frost diminishes. Mexican shipments decrease as the weather becomes too hot for production of the six vegetables and water is scarce.

Changing Market Shares

Market shares for Florida and Mexico were calculated for tomatoes, bell peppers, cucumbers, green beans, eggplant, and squash from shipments data compiled by the U.S. Department of Agriculture (2). Market shares for each vegetable were examined for the three different monthly periods: (1) October-June; (2) December-April; and (3) May-June (tables 25 to 30). The data provide information on the competitive position of each area in supplying U.S. fresh vegetable markets as the winter production and marketing season begins, peaks, and tapers off.

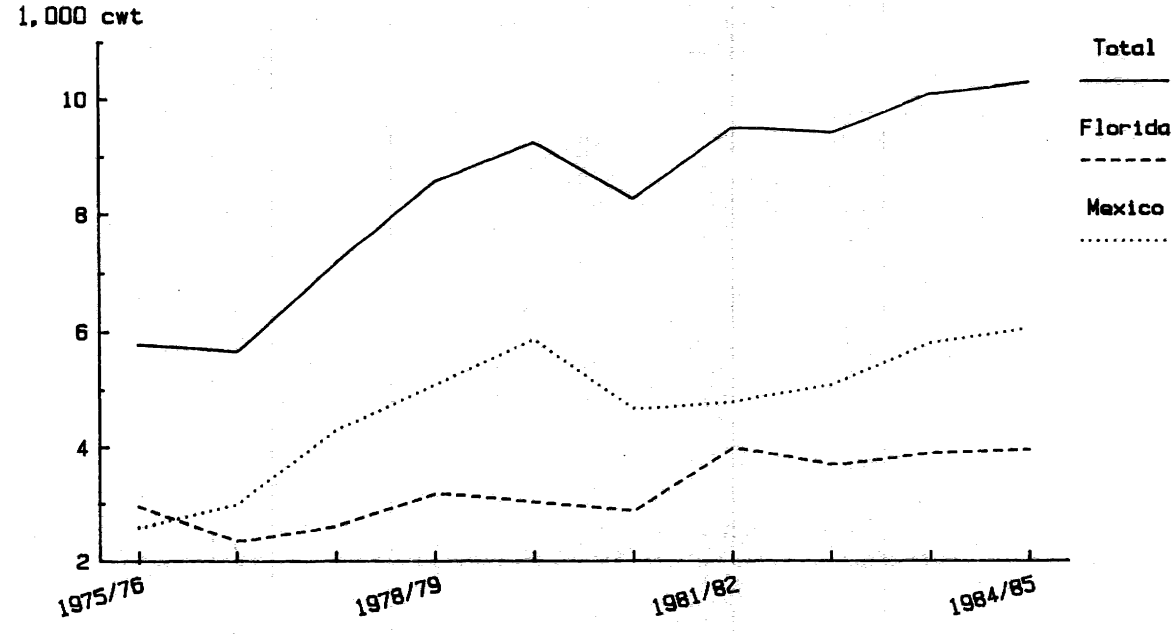
Tables 25 through 30 provide a competitive picture similar to that shown in the analysis of shipments. Periods of contraction and expansion in each area are indicated by changes in their market shares. Florida's rapid expansion in 1972/73 through 1975/76 increased its market share for all vegetables during that time. The peso devaluation in Mexico and the freeze in Florida in 1976/77 reversed the trend for tomatoes and cucumbers which significantly increased Mexican market share for these vegetables during the December-April period (figs. 22 and 23). Strong spring crop production of these vegetables in Florida, however, restricted the potential for even more loss in share for the production year (figs. 24 and 25). The production expansion occurring in Florida since the 1977/78 season permitted this area to remain dominant in terms of season market share for tomatoes, bell peppers, and green beans despite strong Mexican shipments. Mexico consistently maintained greater market share for cucumbers over the past eight production seasons.

Figure 18
Tomato Shipments to U.S. Markets, December-April



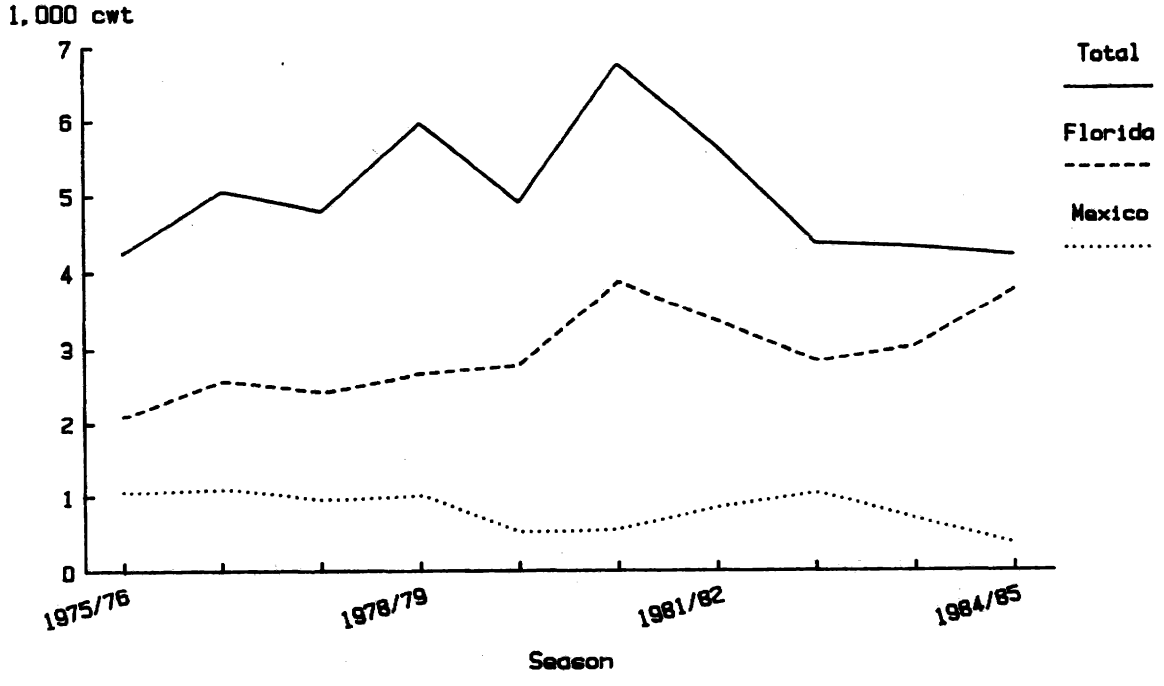
Source: (2).

Figure 19
Other Vegetable Shipments to U.S. Markets, December-April 1/



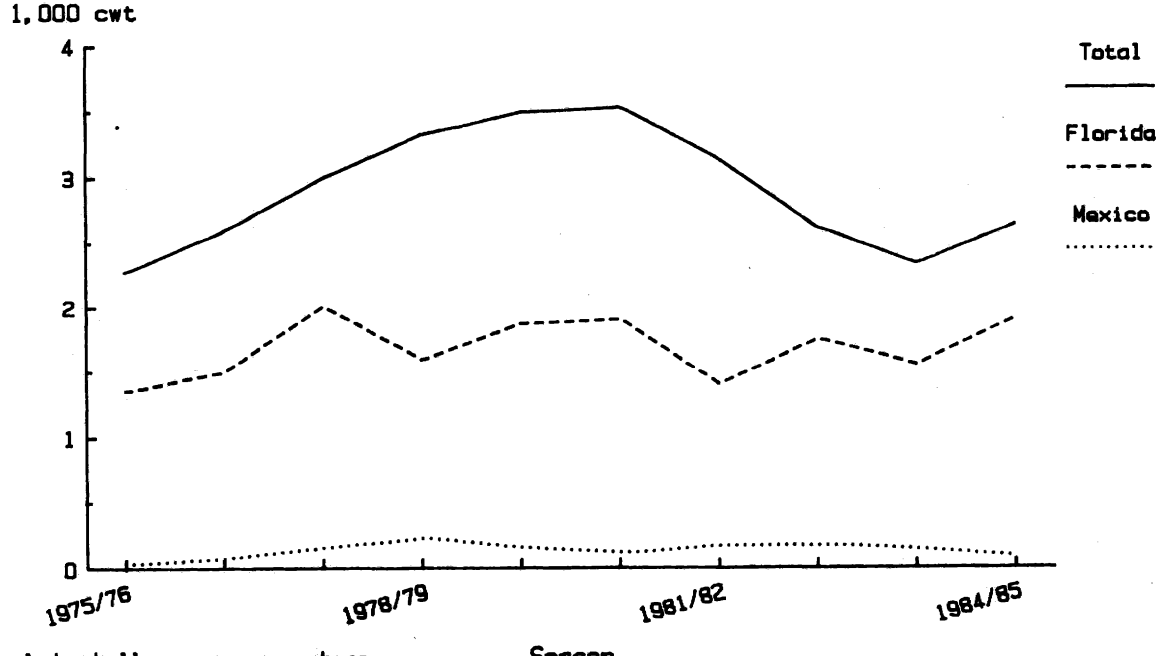
1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: (2).

Figure 20
Tomato Shipments to U.S. Markets, May-June



Source: (2).

Figure 21
Other Vegetable Shipments to U.S. Markets, May-June 1/



1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: (2).

Table 25—Tomatoes: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1975/76	42.4	37.4	20.2	44.1	51.0	4.9	49.3	25.1	25.6
1976/77	34.6	46.2	19.2	28.5	69.0	2.5	50.9	22.1	27.0
1977/78	36.8	42.5	20.7	35.7	61.4	2.9	50.5	20.0	29.5
1978/79	43.5	33.4	23.1	45.6	53.3	1.1	44.8	17.2	28.0
1979/80	51.3	30.2	18.5	52.7	45.4	1.2	56.8	10.7	32.5
1980/81	49.2	26.9	23.0	49.7	45.0	5.3	57.1	8.4	34.5
1981/82	52.3	27.7	20.0	54.5	40.2	5.3	59.4	15.3	25.3
1982/83	55.7	37.3	7.0	52.7	45.1	2.2	64.9	24.2	10.9
1983/84	54.5	38.7	6.8	46.8	51.8	1.4	70.5	16.3	13.2
1984/85	59.8	36.8	3.4	47.0	51.9	1.1	90.0	8.6	1.4

1/ Relative market shares were calculated as each area's percentage share of total U.S. tomato shipments.

Source: (2).

Table 26—Bell peppers: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1975/76	55.9	25.9	18.2	58.0	39.5	2.5	65.7	4.1	30.2
1976/77	52.4	31.8	15.8	46.8	49.8	3.4	75.3	7.3	17.4
1977/78	49.3	35.2	15.5	44.8	52.2	3.0	80.0	6.0	14.0
1978/79	43.6	31.7	24.7	47.2	50.7	2.1	55.1	8.3	36.6
1979/80	37.7	38.0	24.3	36.0	59.9	4.1	63.5	5.6	30.9
1980/81	48.9	23.8	27.3	44.0	42.2	13.8	71.6	1.7	26.7
1981/82	41.3	28.6	30.1	43.6	45.2	11.2	47.0	4.1	48.9
1982/83	54.8	26.0	19.2	53.5	36.3	10.2	60.3	5.8	33.9
1983/84	50.7	39.7	9.6	45.4	51.4	3.2	68.1	4.9	27.0
1984/85	51.9	40.6	7.5	40.6	56.3	3.1	87.3	1.3	11.4

1/ Relative market shares were calculated as each area's percentage share of total U.S. bell pepper shipments.

Source: (2).

Table 27—Cucumbers: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1975/76	44.8	36.1	19.1	35.2	58.9	5.9	52.9	0.3	46.8
1976/77	38.3	38.1	23.6	29.0	62.9	8.1	44.3	1.0	54.7
1977/78	37.5	42.9	19.6	20.0	73.7	6.3	58.6	1.3	40.1
1978/79	36.3	40.0	23.7	23.9	70.8	5.3	41.4	1.2	57.4
1979/80	30.8	45.2	24.0	18.8	75.2	6.0	45.4	.9	53.7
1980/81	31.2	42.4	26.4	22.3	67.7	10.0	36.1	1.6	62.3
1981/82	37.4	38.2	24.4	33.1	57.8	9.1	37.2	3.0	59.8
1982/83	35.5	49.4	15.1	24.4	69.5	6.1	66.8	4.4	28.8
1983/84	35.8	48.3	15.9	28.5	67.7	3.8	60.0	3.6	36.4
1984/85	40.7	46.8	12.5	32.6	65.5	1.9	63.3	1.5	35.5

1/ Relative market shares were calculated as each area's percentage share of total U.S. cucumber shipments.

Source: (2).

Table 28—Green beans: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1975/76	87.1	9.6	3.3	87.3	12.5	0.2	83.2	0	16.8
1976/77	80.7	16.0	3.3	77.7	22.3	0	80.7	.7	18.6
1977/78	78.5	21.5	0	70.0	30.0	0	88.7	5.7	5.6
1978/79	73.4	23.1	3.5	71.0	28.8	.4	58.9	10.9	30.2
1979/80	71.3	22.9	5.8	70.3	30.1	0	65.1	5.8	29.1
1980/81	70.0	18.1	11.9	66.9	27.7	5.4	71.8	3.6	24.6
1981/82	77.5	16.1	6.4	79.0	21.0	0	56.6	1.4	42.0
1982/83	78.7	19.6	1.7	75.2	24.0	.8	88.9	4.0	7.1
1983/84	78.1	19.6	2.3	73.2	25.5	1.3	91.4	1.7	6.9
1984/85	67.6	21.4	11.0	66.5	30.2	3.3	57.7	3.2	39.1

1/ Relative market shares were calculated as each area's percentage share of total U.S. green bean shipments.

Source: (2).

Table 29—Eggplant: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1977/78	57.3	42.5	0.2	48.7	50.9	0.4	69.7	30.3	0
1978/79	48.8	45.0	6.2	36.0	56.1	7.9	60.9	36.8	2.3
1979/80	48.9	49.6	1.5	33.6	65.6	.8	84.3	15.1	.6
1980/81	56.8	42.4	.8	39.0	60.8	.2	83.1	14.7	2.2
1981/82	56.2	41.9	1.9	43.6	55.0	1.4	76.0	20.5	3.5
1982/83	51.3	44.2	4.5	36.2	59.1	4.7	82.4	13.5	4.1
1983/84	47.2	50.9	1.9	33.2	65.1	1.7	86.7	12.0	1.3
1984/85	51.2	45.7	3.1	39.7	57.5	2.8	86.3	12.0	1.7

1/ Relative market shares were calculated as each area's percentage share of total U.S. eggplant shipments.

Source: (2).

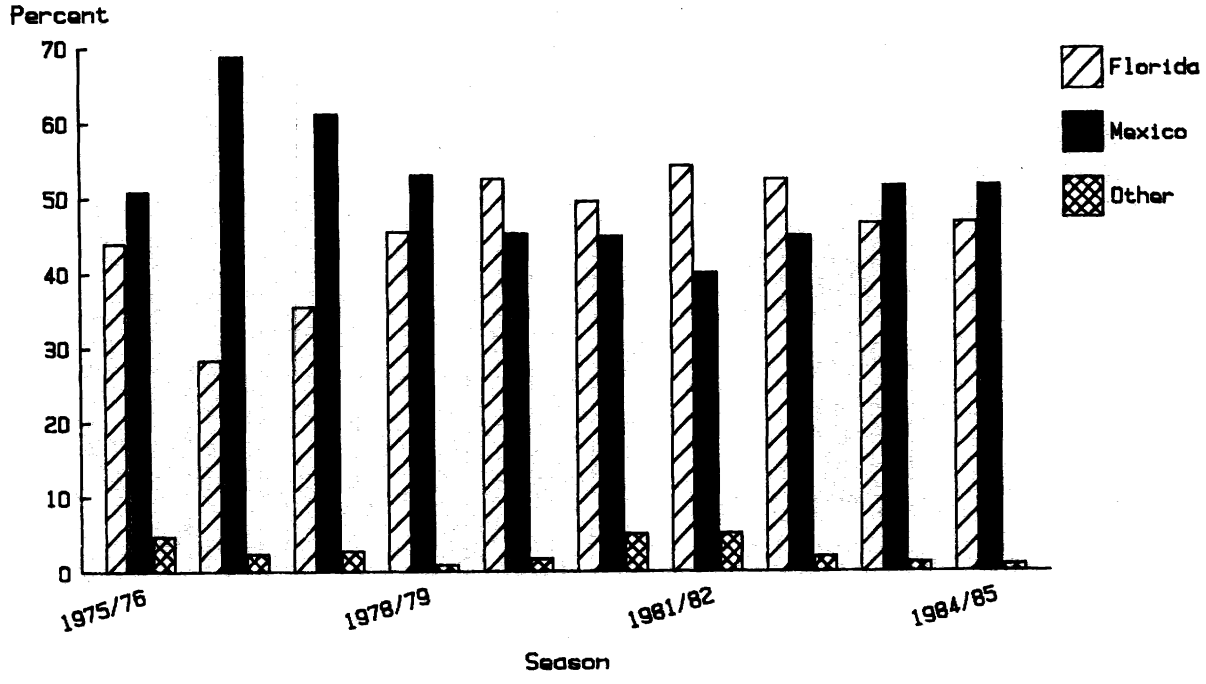
Table 30—Squash: Relative market shares for Florida and Mexico 1/

Season	October-June			December-April			May-June		
	Florida	Mexico	Other	Florida	Mexico	Other	Florida	Mexico	Other
	Percent								
1977/78	48.7	46.0	5.3	42.3	56.6	1.1	65.6	18.0	16.4
1978/79	41.3	53.5	5.2	32.9	66.1	1.0	50.8	23.6	25.6
1979/80	45.0	48.6	6.4	41.3	57.6	1.1	53.2	20.4	26.4
1980/81	49.2	45.9	4.9	42.6	56.1	1.3	66.4	14.9	18.7
1981/82	46.4	45.4	8.2	42.3	53.3	4.4	49.7	19.3	31.0
1982/83	41.6	51.7	6.7	35.0	59.1	5.9	72.8	18.8	8.4
1983/84	40.8	52.1	7.1	36.2	57.8	6.0	66.8	26.7	6.5
1984/85	41.8	54.0	4.2	36.0	61.0	3.0	74.6	18.6	6.8

1/ Relative market shares were calculated as each area's percentage share of total U.S. squash shipments.

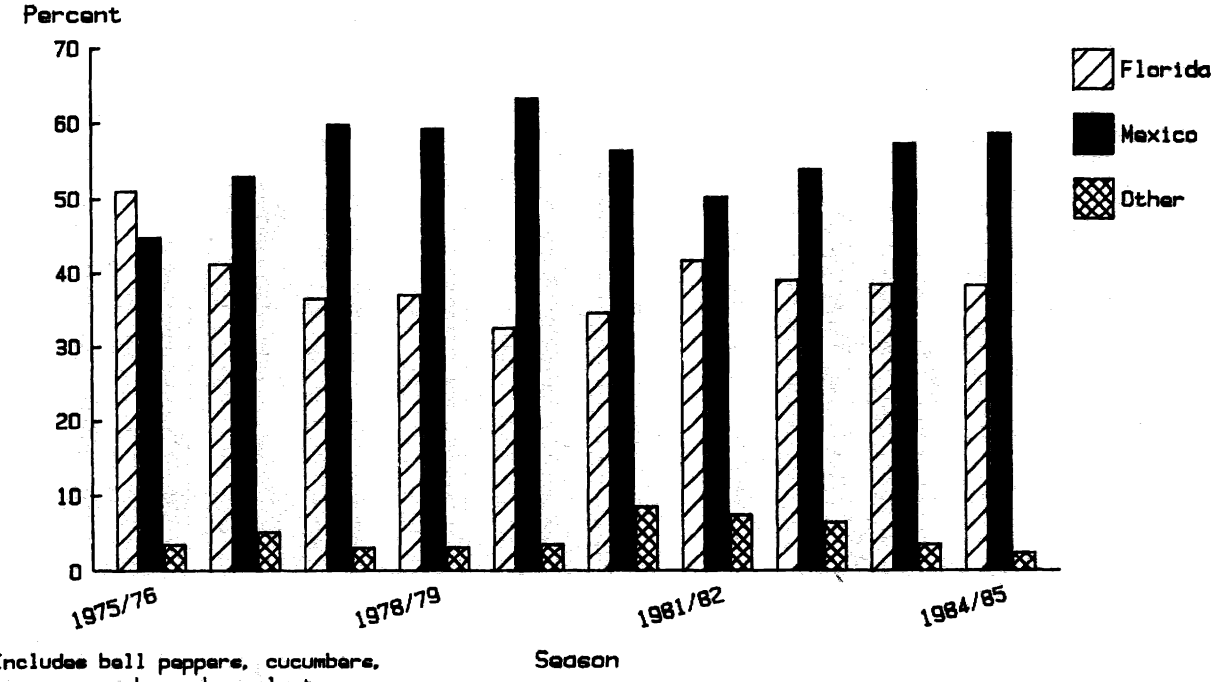
Source: (2).

Figure 22
Market Share of Tomatoes in U.S. Markets, December-April



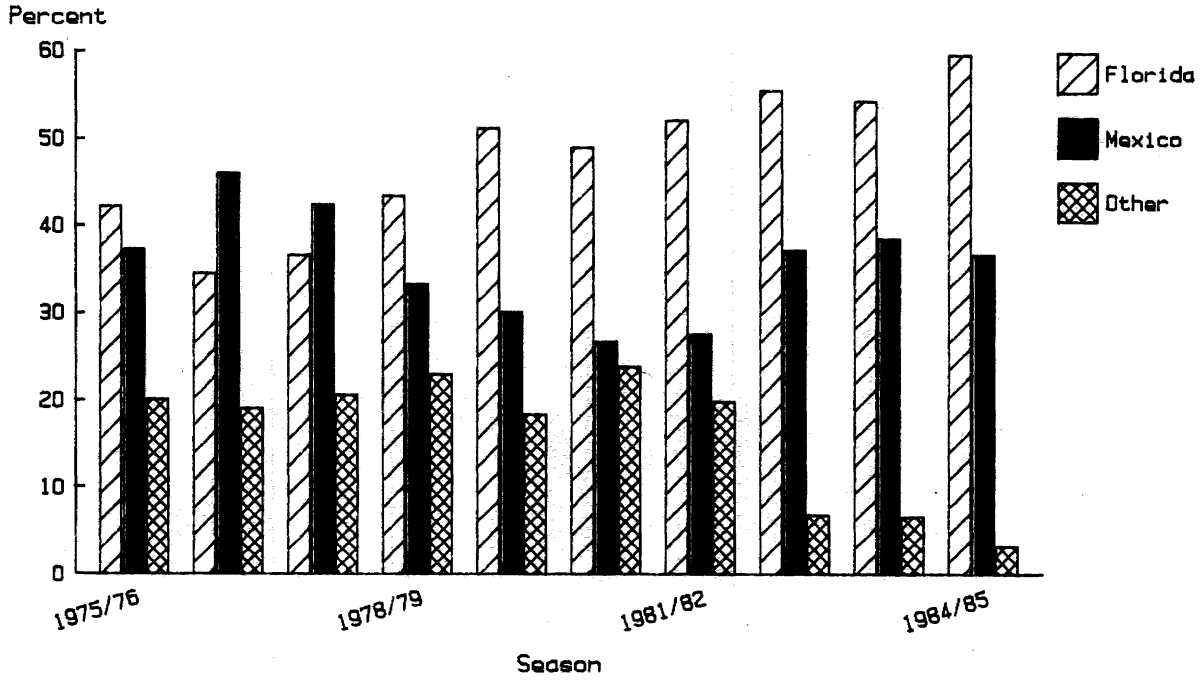
Source: Computed from data in (2).

Figure 23
Market Share of Other Vegetables in U.S. Markets December-April 1/



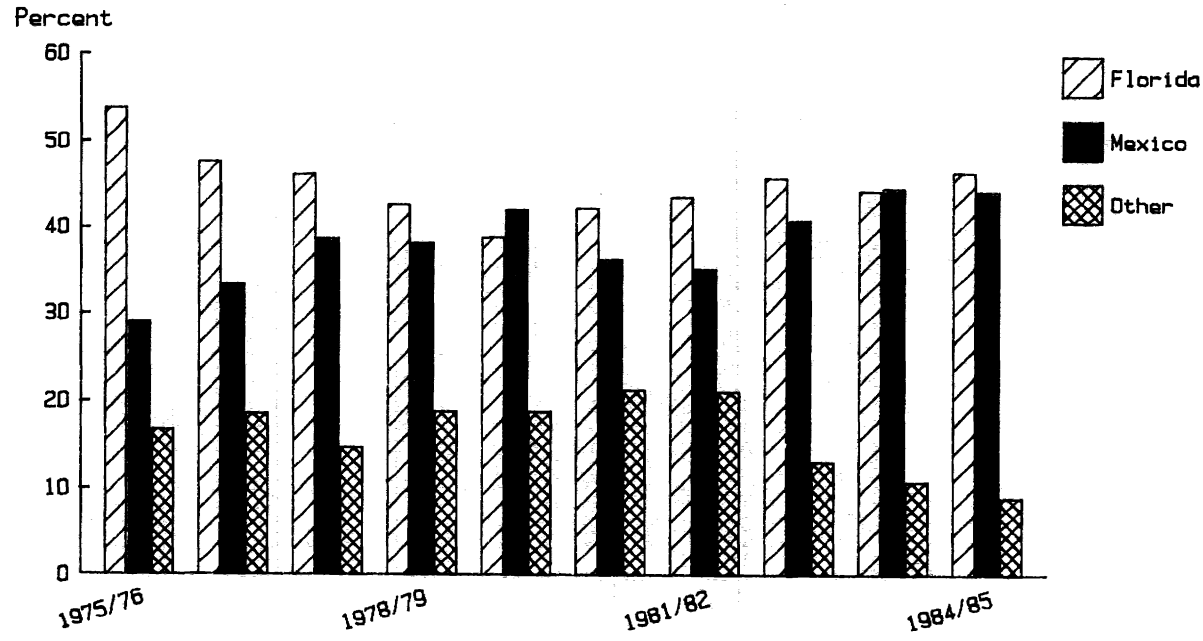
1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: Computed from data in (2).

Figure 24
Market Share of Tomatoes in U.S. Markets, October-June



Source: Computed from data in (2).

Figure 25
Market Share of Other Vegetables in U.S. Markets October-June 1/



1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: Computed from data in (2).

Market shares for the December-April period remained highly variable between 1970/71 and 1983/84. As both areas are in full winter production during this time, the effect of the Florida freezes on market share is readily evident. Mexico strengthened its market share for all vegetables during this period and remains the dominant supplier of cucumbers, eggplant, and squash. This situation continued in the 1984/85 season due to the January 1985 freeze in Florida. The average season market share for Florida-produced winter vegetables dropped to 50 percent as a result of the freeze.

Florida remained dominant in market share for all six vegetables during May-June as crop production moves north with the onset of spring, vastly increasing production area, and because of later harvests in areas affected by freezes earlier in the production season (figs. 26 and 27). Mexican exports have historically tended to fall during this period.

Macroeconomic Factors Affecting Production and Trade

The initiative to expand or contract production depends upon a grower's expectations of net returns. These expectations may be based on previous returns relative to specific market conditions which existed at that time, in addition to expectations as to future returns based on anticipated market conditions. Producers respond accordingly by expanding production when expectations of increased net returns are high or by contracting production when net returns are expected to be low. Conditions enhancing the possibility of increased net returns tend to strengthen the competitive position of that area, while the reverse also holds true. Previous sections of this report assessed the cause and impact of production and trade trends on historical Florida and Mexican market shares in determining each area's competitive position. These production and trade trends are directly influenced by a number of macroeconomic factors existing in Florida and Mexico, which affect both production costs and prices received, and ultimately, net returns to producers in each country. Therefore, consideration of these factors is important in assessing the past and current competitive situation as well as future trends.

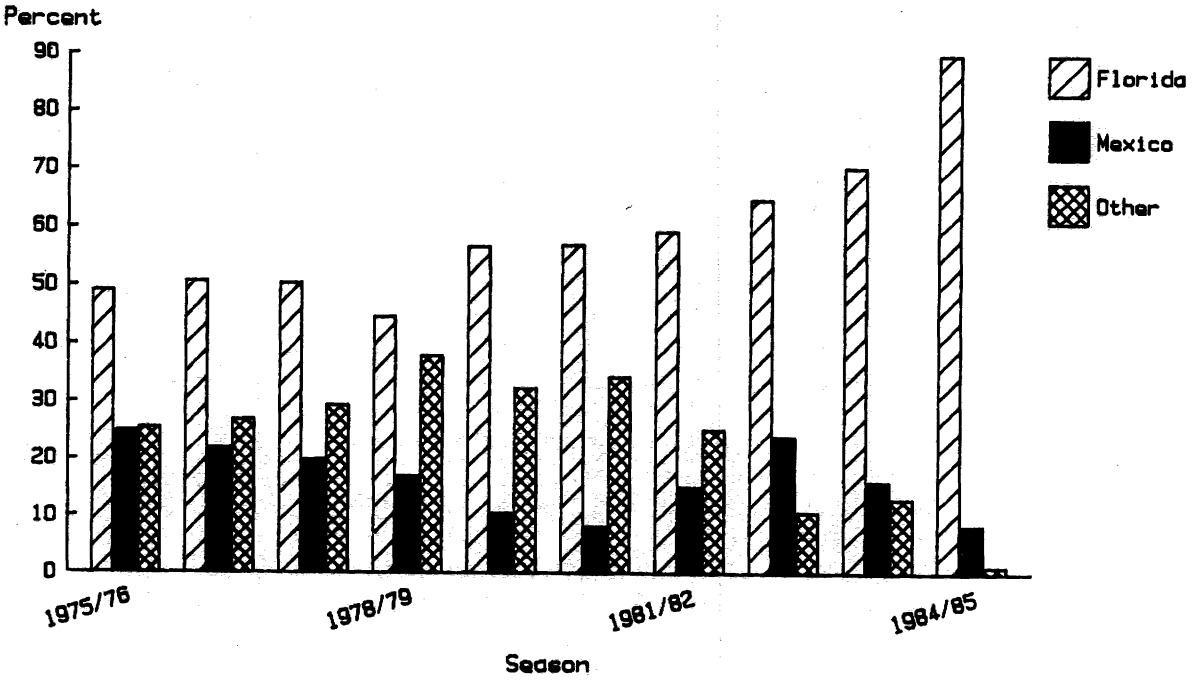
Two macroeconomic factors important during recent years are (1) devaluation of the Mexican peso, and (2) the subsequent rapid increase in input price levels in Mexico. Both factors are interrelated; currency devaluation has an immediate effect on prices paid for production inputs that must be imported, and on prices received for products exported. The two factors must, therefore, be evaluated jointly.

Peso Devaluation and Input Price Inflation

The macroeconomic and exchange rate policies followed by the Mexican Government led to periodic overvaluation of the peso. A stable peso/dollar rate was in the past viewed as an indicator of the soundness of macroeconomic policies and of the Mexican economy. Therefore, the exchange rate was fixed at 12.5 pesos per dollar in the early 1960s and held at that level until 1976 (table 31).

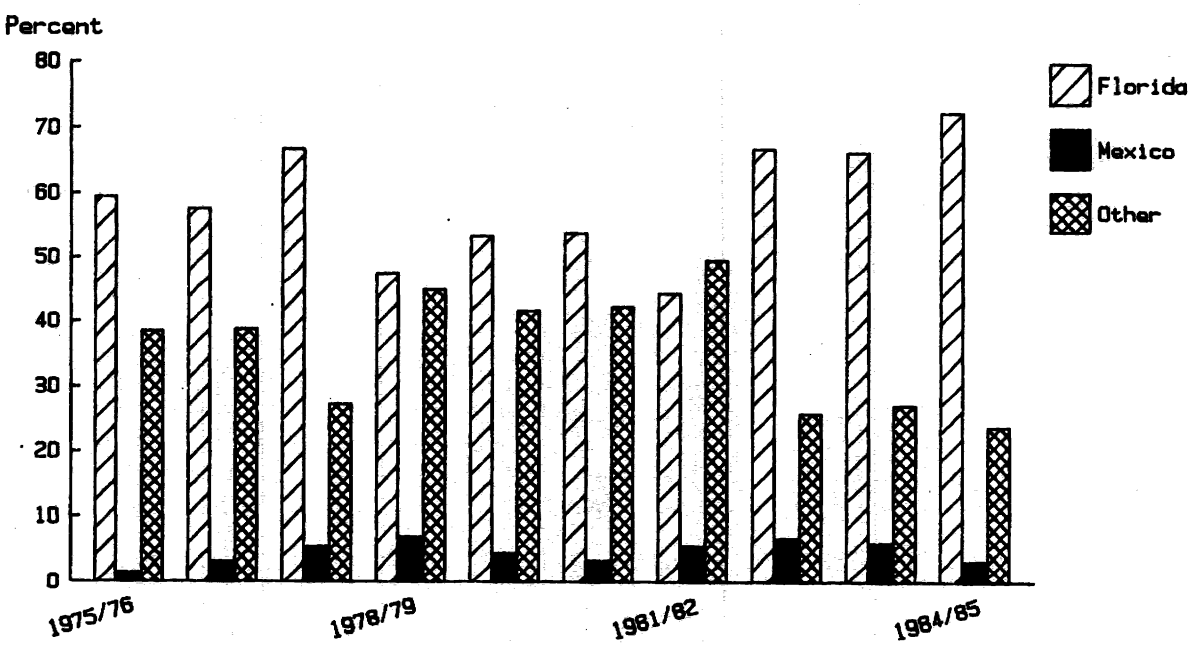
Faced with an unfavorable balance of trade caused by a rapidly increasing rate of inflation and major capital outflows to the United States during 1976, the Mexican Government changed the exchange rate to 19.9 pesos per dollar. The Mexican Government permitted another devaluation of the peso in February 1982; but, with inflation running at 100 percent, this adjustment became inadequate.

Figure 26
Market Share of Tomatoes in U.S. Markets, May-June



Source: Computed from data in (2).

Figure 27
Market Share of Other Vegetables in U.S. Markets May-June 1/



1/ Includes bell peppers, cucumbers, green beans, squash, and eggplant.
Source: Computed from data in (2).

By August 1982, the peso was floated and an equilibrium rate of 90 pesos to the dollar was established for most transactions. A lower rate was applied for exchanging export earnings for pesos. Until recently, the peso was devalued at 0.21 peso per day as the rate of inflation in Mexico exceeded that in the United States. In August 1985, the Mexican Government eliminated the fixed daily devaluation and put the peso under a "regulated" float system. Import license requirements are being replaced by import tariffs as a means of regulating trade.

Devaluation of the peso may increase net returns for Mexican vegetables exported to the United States in the short run because it raises the price (in pesos) Mexican producers receive relative to costs. Even though export vegetable production may become more profitable because of the devaluation, imported input costs will also increase. Advantages initially provided by increased returns are reduced and the competitive position of Mexican producers is weakened.

A production cost ratio can be used to measure changes in the cost competitive positions of Florida and Mexico as a result of previous peso devaluations (table 31). Using the exchange rate and indices for prices paid in Florida and Mexico, the ratio measures changes in relative production costs in Florida and Mexico for products marketed in the United States. Thus, changes in the competitive positions of the respective countries can be evaluated by accounting for relative changes in production costs caused by inflation in the United States and Mexico, in addition to accounting for changes in relative

Table 31—Prices paid: Wholesale prices and producer prices, Mexico and United States

Year	Mexico wholesale price index	U.S. producer price index	Exchange market	Cost ratio 1/ Mexico/Florida
	----- 1975=100 ----		Pesos/dollar	
1965	51.9	55.2	12.50	0.940
1970	59.8	63.1	12.50	.948
1975	100.0	100.0	12.50	1.000
1976	122.3	104.6	21.84	.669
1977	172.6	111.0	22.74	.855
1978	199.8	119.7	22.77	.916
1979	236.4	134.7	22.82	.961
1980	294.3	153.6	2/ 23.42	1.023
1981	367.0	167.5	2/ 35.69	.767
1982	571.5	171.0	2/ 157.85	.265
1983	1,185.1	173.1	2/ 174.77	.490
1984	2,018.9	177.3	2/ 220.00	.647

1/ Calculated as [(MWPI)/(ER/ERBY)]/USPPI where MWPI is the Mexican wholesale price index, ER is the exchange rate, ERBY is the exchange rate in the base year, and USPPI is the U.S. producer price index.

2/ Average of daily exchange rates over the marketing season.

Source: (9).

market advantage as a result of peso devaluations. A cost ratio less than 1.0 suggests the competitive advantage has shifted to Mexico. An increase in the ratio from one year to the next indicates a shift in cost competitive advantage favoring the United States.

Examination of table 31 shows the short-term cost competitive advantages received by Mexican producers due to peso devaluations and the subsequent loss of advantage as inflation increased. The peso devaluation of 1976 immediately enhanced Mexico's competitive advantage which gradually shifted back to the United States until 1980. The devaluation of 1981 and additional devaluations since 1982 have shifted the advantage back to Mexico. The 1984 ratio of 0.647 compared with the 1983 ratio of 0.490 suggests the strengthening of the U.S. competitive position during the last two production seasons.

Input Prices

Changes in input prices directly affect production costs in Florida and Mexico. The largest component of vegetable production costs in Florida and Mexico is labor. Other inputs include fertilizer, machinery, pesticides, packing and shipping cartons, and transportation.

Wage rates are an important indicator of changes in labor costs. Rural wage rates significantly increased in Florida and Mexico between 1965 and 1984 (table 32). Average U.S. wage rates rose yearly from $7.63 per day in 1965 to $31.64 per day in 1983. The Mexican wage rate (expressed in U.S. dollars) has fluctuated over the same period. Mexican wages increased faster than U.S. wages over the 5-year period 1970-74. The 1976 peso devaluation temporarily lowered the Mexican rural wage rate in terms of dollar value by almost 18 percent. However, political pressures to increase the rural wage rate arose after the devaluation. The result was an increase in the rural wage rate of 80 percent between 1976 and 1980. Since 1980, rural wage rates have dropped 37 percent to reach 1978 levels. The index of farm wages for Florida increased by 35 percent during the 5-year period of 1978 to 1983. Mexican wage rates in 1983 were only 11 percent of the Florida rate. This suggests Mexican vegetable producers have maintained a labor cost advantage over U.S. producers.

Fertilizer is another major cost. Fertilizer prices increased in the United States by 37 percent from 1978 to 1983 with most of the increase occurring during 1981 and 1982. In dollar terms, fertilizer costs in Mexico are cheaper now than before devaluation because of domestic production. Mexican producers purchase little or no fertilizer from the United States, according to our interviews with Mexican vegetable growers and agribusiness personnel.

Prices for machinery, chemicals, and cartons have increased in Florida and Mexico during the last 5 years, with machinery prices showing the largest jump of the cost items. The price of cartons in Florida has increased by 54 percent in addition to a 33-percent increase in chemical prices. Most of the increase occurred during 1982 and 1983. Prices for these items in Mexico have risen because of high reliance on U.S. suppliers and current exchange and inflation rates.

PRODUCTION PRACTICES AND COSTS

This section describes factors which determine the costs of producing and marketing each of the six commodities in Florida and Sinaloa during the

1984/85 season. Enterprise budgets comparing costs between the two regions are also presented to examine the relative cost positions of producing winter fresh vegetables in each area and to determine which country may hold a cost advantage. The budgets were developed by surveying Florida and Sinaloan growers and are based on the predominant technology and trend yields in each production area. The total costs consist of all variable and fixed costs including the opportunity costs of land and management. Florida costs are f.o.b. at the packing house while the Sinaloan cost estimates are f.o.b. Nogales with export tariffs and crossing charges paid. The cost estimates are representative of the months when Florida and Sinaloa compete.

Table 32—Agricultural wages in Mexico and Florida

Year	Mexico			Florida	
	Minimum daily wage		Index	Average earnings	Index
	Pesos/day	Dollars/day 1/	1965=100	Dollars/day 2/	1965=100
1965	18.17	1.45	100	7.63	100
1966	19.50	1.56	108	8.61	113
1967	21.17	1.69	117	9.72	128
1968	22.50	1.80	124	10.62	139
1969	24.86	1.99	137	10.73	141
1970	26.75	2.14	148	11.09	145
1971	29.06	2.32	160	11.67	153
1972	30.90	2.47	170	13.31	174
1973	38.70	3.10	214	14.95	196
1974	49.09	3.93	271	16.78	220
1975	55.60	4.45	307	17.70	232
1976	79.91	3.66	252	19.53	256
1977	88.31	3.88	268	20.67	271
1978	103.44	4.54	313	4/	4/
1979	124.33	5.45	376	24.03	315
1980	154.44	3/ 6.59	454	4/	4/
1981	200.84	3/ 5.63	388	27.36	359
1982	365.00	3/ 3.45	238	4/	4/
1983	550.00	3/ 3.53	243	31.64	415
1984	860.00	3/ 4.15	286	4/	4/

1/ Pesos per day divided by the peso/dollar exchange rate.

2/ Average earnings received during the year by all hired farm workers divided by the average days worked at farm jobs.

3/ Calculated using the average of daily exchange rates over the marketing season reported in table 31.

4/ Data not collected.

Source: (4, 12).

Tomatoes

Tomato cultural practices differ widely between Florida and Sinaloa and between staked and ground tomatoes. Perhaps the most important difference is the widespread use of plastic mulch in Florida. Plastic mulch provides for uniform soil moisture and temperature conditions, reduces fertilizer leaching, and aids in weed control. Such changes in production practices directly affect the cost positions of tomato producers in both areas.

Production Practices in Florida

The areas chosen for analysis in this study include Dade County, southwest Florida, and Palmetto-Ruskin, major areas of competition to imported Sinaloan tomatoes.

Florida tomato producers use two distinct production methods: staked production used primarily in southwest Florida and the Palmetto-Ruskin area, and ground production used primarily in Dade County. Staked tomatoes are transplanted onto a raised plastic mulch bed and later staked by tying the plants with three to four lines of plastic strings held by 4.5-foot stakes placed between plants. Ground tomatoes are directly seeded onto slightly raised plastic mulch beds. At planting, the seeds are mixed with a "plug mix" containing peat, vermiculite, and a wetting agent.

The principal change in Florida tomato production practices in the past 5 years was the widespread adoption of hybrid varieties. Improved varieties such as FTE-12, Duke, and Sunny, though costly ($400 to $800 per pound of seed), are higher yielding, concentrate production, and produce larger and firmer fruit than traditional varieties. Increased use of laser leveling of fields has also contributed to increases in tomato yields by providing greater uniformity of soil moisture. Laser leveling is done mostly on new fields or on fields where drainage ditches need to be remade.

Another significant change in production practices occurred in south Florida as a result of the 1977/78 freeze. Since then, most tomato growers in Dade County have acquired sprinkler irrigation systems specifically designed and used to reduce frost damage to crops.

Practically all tomatoes grown in Florida for the winter market are planted on beds raised 4-8 inches high. Beds are 30-40 inches wide and separated by 5- to 6-foot alleys. Some tomatoes grown in the Palmetto-Ruskin area have a spacing of up to 12 feet between bed centers. All tomato beds are fumigated at least 2 weeks prior to planting to ensure a pest-free root environment. Plastic films of various types (black being the most common for crops harvested in midwinter) cover the beds. Plastic film helps seal in the fumigant gas during fumigation and provides greater temperature and humidity uniformity in the root zone. Fertilizers are applied during the bed formation prior to laying the plastic.

Tomato plants are separated 15-30 inches in the bed. The highest plant densities are found in Dade County ground tomatoes and the lowest in Palmetto-Ruskin staked tomatoes. Transplanting or direct seeding of tomatoes is done mechanically. Containerized transplants are grown by large growers or purchased from greenhouse operations.

Most tomato growers use preventive spray programs to control diseases. Copper and maneb or manzate continue to be the main tomato fungicides used. Although some scouting for insects is being done, most growers also regularly spray insecticides. Methamidophos and methomyl are still the most widely used insecticides.

Limited problems with weeds are encountered in fumigated beds. To control weeds in the alleys between beds, growers spray tomato fields one to three times with herbicides, most often paraquat and metribuzin.

Most cultural practices are mechanically performed. Some hand-labor operations have not been replaced, harvesting being the principal one. Other labor-requiring operations include thinning, pruning, and tying plants.

Another significant change has occurred in harvesting practices. Most tomatoes grown in Florida are picked in the mature green stage with only around 10 percent picked when vine-ripe. Concentrated production brought about by the widespread use of hybrid varieties has resulted in reduced pickings. Fields once picked three to five times, depending on market and field conditions, are now picked two to three times. Ground-grown tomatoes are picked one to two times.

Tomatoes are picked in 30-pound buckets and dumped either into 900- to 1,000-pound wooden bins or larger fiberglass gondolas used to haul the fruit to the packing house. At the packing house, tomatoes are washed, waxed, sized, and packed mechanically. Most packing house labor is used for grading and operating equipment. A few large packing houses have recently automated the palletizing operation.

Production Practices in Sinaloa

Sinaloan producers also use staked and ground production methods for tomatoes; however, staked production is more common. Stakes are placed at intervals varying from 5-8 feet. Three or four parallel strings are tied on both sides of the plant to hold the plant erect during development. In previous seasons, two wands (smaller stakes) were placed between the stakes, and cord was used to tie the plants. The wands have recently been eliminated by reducing the distance between the stakes and using wire in place of cord. This change in practice has significantly reduced cost. Stakes are now placed 1.2 to 1.5 meters (3'11" to 4'11") apart instead of the former spacing of 1.8 to 2 meters (5'11" to 6'6") with wands between the stakes. The installation cost per stake is 3 to 3.5 pesos. Hand placement of stakes at planting and the removal of stakes and wires at the end of the season are very labor intensive. Labor and materials for staked production make up a significant part of production costs.

The distance between rows varies from 1.8 to 2 meters (5'11" to 6'6") and the distance between plants is 0.25 to 0.30 meters (9" to 11"). For this study, the plant population for the row spacing is 16,500 plants per hectare or 6,680 plants per acre.

Hybrid seeds are imported from the United States. The most popular varieties are Sunny and Contessa, at $550 per pound. Growers usually test other seed varieties in some rows of the field each season.

Seeds are hand-planted in polystyrene plastic forms and then transferred to greenhouses. Much of the planting media, as well as the forms, are imported. After 30 days in the greenhouse, the plants are transplanted to the fields. Most larger growers operate greenhouses.

Fertilizer combinations vary widely among growers. However, combinations of elemental nitrogen, phosphorus, potassium, mixed with minor quantities of zinc, iron, and calcium, are commonly used. The soil is alkaline, hence the fertilizer elements are applied in combination with sulphur. Fertilizer use has increased due to heavier plant population and more intensive production practices.

The method of fertilizer application varies primarily with the growth stage and is similar for each of the six vegetables. Fertilizer is applied by hand and tractor before planting and while plants are small. Later, it is mixed with the irrigation water. Pesticides are applied mostly by hand. Herbicides are applied aerially only when plants are small because heavy plant population reduces the effectiveness of the application. In rainy seasons, aerial applications may be the only usable form of chemical application. Tractor sprayer use has increased with the adoption of "high wheel" tractors that can clear the stakes.

The crop is cultivated with small tractors three to four times during the season. In addition, fields are cultivated by hand. Some hand cultivation is needed to break the hard soil crust that follows irrigation. Other hand operations include weeding, pruning, and placing additional wires or cords as plants grow larger.

Fields are normally irrigated every 8-10 days. Water from the main canal flows to a delivery canal inside the field and then to alternating plant rows, leaving a dry row for weeding, pruning, and chemical applications or picking. The next application alternates to the dry row.

Picking and packing are done completely by hand and are, therefore, very labor intensive. Tomatoes are picked every other day. After picking, tomatoes are dumped into a large fiberglass tank mounted on a truck or small trailer frame. At the packing house, they are dumped into a water tank to remove field heat and to clean the vegetable. A few producers heat the water in the tank, a practice which has proven to increase the marketing life of the product.

The process at the packing house starts with washing and waxing. Tomatoes are then sorted as either export quality or domestic quality and by color and size, packed, and finally banded in pallets and precooled before shipping.

Production Costs in Florida and Sinaloa

Cost budgets were developed for mature green staked tomatoes produced in Palmetto-Ruskin and southwest Florida and vine-ripe staked tomatoes produced in Sinaloa (table 33), as well as for mature green ground-grown tomatoes produced in Dade County and Sinaloa (table 34). The tables compare production, harvesting, and marketing costs for Florida and Sinaloan producers by production method. Competition in the winter fresh tomato market primarily involves Dade County mature green ground-grown tomatoes and Sinaloan vine-ripe staked tomatoes. These costs are compared in table 35.

Table 33—Mature green and vine-ripened tomatoes: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Florida (mature green staked)		Sinaloa (vine ripened)
	Palmetto/Ruskin	Southwest	
	Dollars/acre		
Preharvest:			
Land rent	83.00	240.00	64.41
Machinery	486.42	429.27	198.20
Fertilizer	300.25	495.43	96.61
Pesticides	501.96	462.65	215.24
Labor and supervision	594.26	638.01	362.21
Interest	103.33	128.79	58.04
Other inputs 2/	494.39	801.14	445.34
Total preharvest	2,563.61	3,195.29	1,440.10
	Cartons/acre		
Yield	1,200	1,100	607.3
	Dollars/carton		
Preharvest cost	2.14	2.90	1.78
Harvesting and packing:			
Picking and packing 3/	2.25	2.30	1.12
Materials	.53	.60	.85
Administrative	4/	4/	.10
Total harvesting and packing	2.78	2.90	2.07
Marketing:			
Selling (commissions)	.15	.15	.76
Transporting	NA	NA	.88
Fees, duties	NA	NA	.64
Total marketing	.15	.15	2.28
Total cost	5.07	5.95	6.13

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor, maintenance, building and machinery depreciation, interest on capital investments, miscellaneous materials, administration costs.

4/ Administrative costs for Florida are included in picking cost.

Table 34—Mature green ground tomatoes: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Dade County	Sinaloa
	Dollars/acre	
Preharvest:		
Land rent	180.00	64.41
Machinery	345.82	164.47
Fertilizer	311.13	96.61
Pesticides	612.73	191.68
Labor and supervision	495.71	241.56
Interest	105.20	44.47
Other inputs 2/	559.39	300.02
Total preharvest	2,609.98	1,103.22
	Cartons/acre	
Yield	1,000	202.43
	Dollars/carton	
Preharvest cost	2.61	2.72
Harvesting and packing:		
Picking and packing 3/	2.44	1.12
Materials	.58	.85
Administrative	4/	.10
Total harvesting and packing	3.02	2.07
Marketing:		
Selling (commissions)	.15	.76
Transporting	NA	.88
Fees, duties	NA	.64
Total marketing	.15	2.28
Total cost	5.78	7.07

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor, maintenance, building and machinery depreciation, interest on capital investments, miscellaneous materials, administration costs.

4/ Administration costs for Florida are included in picking cost.

Table 35—Mature green ground and vine-ripe staked tomatoes: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Dade County (ground)	Sinaloa (staked)
	Dollars/acre	
Preharvest:		
Land rent	180.00	64.41
Machinery	345.82	198.20
Fertilizer	311.13	96.61
Pesticides	612.73	215.24
Labor and supervision	495.71	362.21
Interest	105.20	58.04
Other inputs 2/	559.39	445.34
Total preharvest	2,609.98	1,440.10
	Cartons/acre	
Yield	1,000	607.3
	Dollars/carton	
Preharvest cost	2.61	1.78
Harvesting and packing:		
Picking and packing 3/	2.44	1.12
Materials	.58	.85
Administrative	4/	.10
Total harvesting and packing	3.02	2.07
Marketing:		
Selling (commissions)	.15	.76
Transporting	NA	.88
Fees, duties	NA	.64
Total marketing	.15	2.28
Total cost	5.78	6.13

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor, maintenance, building and machinery depreciation, interest in capital investments, miscellaneous materials, administration costs.

4/ Administrative costs for Florida are included in picking cost.

Preharvest production costs during the 1983/84 season were considerably lower for Sinaloan vine-ripe tomatoes than for mature green staked tomatoes produced in the Palmetto-Ruskin area and southwest Florida (table 33). Pesticides, machinery, labor, and fertilizer were the major preharvest cost items in all three areas, with labor being the highest. Labor costs were 23 percent, 20 percent, and 25 percent of total preharvest costs for Palmetto-Ruskin, southwest Florida, and Sinaloan producers. Land rent was also a significant cost to tomato producers in southwest Florida, who had the highest preharvest cost per carton for staked tomato production.

Harvesting and packing costs were also higher for southwest Florida producers than for Palmetto-Ruskin and Sinaloan producers. Marketing costs of $2.28 per bushel significantly increased the cost per carton for Sinaloan tomatoes. Marketing costs were 38 percent of the total cost for producing tomatoes in Sinaloa, compared with 3 percent for producers in the Palmetto-Ruskin and southwest Florida areas. Sinaloan tomato producers not only face higher transportation costs, but also must pay the fees, commissions, and duties associated with exporting fresh vegetables to the United States.

Even though mature green ground-produced tomatoes have not been produced in Sinaloa for export to the extent that staked tomatoes have, this production practice has increased in popularity during recent years. If Sinaloan producers are able to significantly increase yields of mature green ground-grown tomatoes, which are usually produced earlier in the production season, Sinaloan tomatoes produced in this manner may increase competition in the U.S. tomato market earlier in the production season.

Competition in the winter fresh tomato market is heaviest for mature green ground-grown tomatoes produced mainly in Dade County and vine-ripe staked tomatoes from Sinaloa. Pesticides and labor constituted the highest preharvest cost items in each area (table 35). Sinaloan producers maintained a cost advantage in total preharvest and harvest and packing costs. However, this advantage was lost due to the high marketing costs of exporting tomatoes to the U.S. market. The total cost of producing mature green ground-grown tomatoes in Dade County was about 6 percent less than the total cost of producing vine-ripe staked tomatoes in Sinaloa.

Bell Peppers

Bell pepper cultural practices also differ widely between Florida production areas and Sinaloa. For example, bell peppers are commonly staked in Sinaloa, an uncommon practice in Florida. Conversely, Florida growers cover prepared beds with plastic mulch, a practice not used in Sinaloa. These and other bell pepper cultural activities are discussed below.

Production Practices in Florida

Southeast and southwest Florida are the areas considered in this analysis. These areas compete with one another and Sinaloa for the winter fresh market for peppers marketed in the United States.

Peppers, like tomatoes, are grown on raised beds covered with plastic mulch. The practice of staking is not common, but some growers are beginning to use small stakes to hold pepper plants upright when fruit set is high. Peppers are usually planted two rows per bed with one to two plants per hill depending on the planting method used.

Palm Beach County peppers are seeded by mixing the seed with a plug mix containing peat, vermiculite, and a wetting agent, and placing it on the bed either by hand or with a planter. Plants are later thinned to a density of one to two plants per hill. Southwest Florida growers transplant containerized seedlings which are produced by large growers or purchased from nurseries. Transplants are set in two rows per bed with one plant per hill and a population density of about 20,000 plants to the acre.

Seepage irrigation is used in both pepper-producing areas. In Palm Beach County, electric motor pumps are used to move water from the district canals to perimeter field ditches. In southwest Florida, these ditches are filled with water from deep wells. In both areas, water is drained from the ditches using diesel engine pumps during rainy periods.

Practically all the fertilizer is applied during bed formation prior to laying the plastic. Preplant fertilizer rates among the production areas are about 300 pounds of nitrogen, 100 to 175 pounds of phosphorus, and 400 to 500 pounds of potassium per acre. Micronutrients are applied mixed in with the main fertilizer.

Most pepper growers maintain preventive spray programs to control diseases and insects, spraying every 5-7 days. Copper and maneb continue to be the main fungicides used on peppers. Although some scouting for insects is done, most growers spray insecticides regularly; methamidophos and methomyl are the most widely used pesticides. Pepper fields are sprayed twice with paraquat to control weeds in the alleys between beds.

Most cultural practices are performed mechanically, but some still require hand labor. Harvesting, thinning, and replanting are the principal labor-requiring operations.

Palm Beach County peppers are picked four to five times and placed in buckets which are loaded onto a conveyor belt 10 to 12 rows wide that is attached to a mobile packing shed or "mule train." A mule train has up to 800 square feet of packing area and is powered by a propane gas engine. The peppers are sorted and packed into 25-pound bushels in the mule train. Culls are left in the field. Peppers for market are loaded onto a truck moving behind the mule train. Most Palm Beach growers market their product either through the State Farmer's Market in Pompano Beach or through a large grower-shipper.

Production Practices in Sinaloa

Cultural practices employed in Sinaloan bell pepper production are almost the same as those for tomatoes. The most common seed used is imported California Wonder-300. Almost all growers operate greenhouses and use of transplants is common. Plants are transplanted to the fields by hand, at intervals of 0.30 to 0.35 meters (12" to 14") in rows spaced 1.2 meters (3'11") apart. This spacing results in a plant population around 26,000 plants per hectare.

Pepper plants are commonly staked in Sinaloa. The stakes are shorter than those used for tomatoes and cucumbers. Often the stakes were used previously in tomato or cucumber production. Wands are not used in pepper production as the stakes are placed every 1.5 to 2 meters (5' to 7').

The method of fertilizer, pesticide, and herbicide application parallels that of tomatoes. However, cultivation practices differ in that peppers are

cultivated three to four times with mules instead of tractors because of the narrow row spacing.

As with tomatoes, picking and packing are very labor intensive in Sinaloa because they are done completely by hand. Peppers are usually picked twice a week.

A few growers use a mobile packing unit for hauling peppers out of the field. As the unit is pulled, usually down the center of the field, workers bring the selected produce to the unit. The packing unit is used in place of the fiberglass tank filled with water used for hauling tomatoes because bell peppers cannot be immersed in water. Peppers are transported to the packing house in large boxes or sacks and there placed in large fiberglass tanks. At the packing house, the boxes are lifted and dumped by cranes onto the sorting lines.

Production Costs in Florida and Sinaloa

Labor costs were the single largest preharvest cost for producing bell peppers in Palm Beach County and Sinaloa (table 36). However, more machine operations were used in southwest Florida as indicated by the slightly higher machinery cost in that area. Fertilizer and pesticides comprised a significant proportion of preharvest costs in all three areas. As expected, land rent and interest costs were highest in Palm Beach County relative to the other two areas. Total preharvest costs in Sinaloa were 49 percent and 46 percent less than preharvest costs in southwest Florida and Palm Beach County.

Harvest and packing costs were 37 percent, 48 percent, and 27 percent of total costs in Palm Beach County, southwest Florida, and Sinaloa. Labor and materials were the major components of these costs. Marketing costs represented almost 50 percent of the total cost f.o.b. at the border of pepper production in Sinaloa. Marketing costs represented only 6 percent of total cost to Palm Beach County growers and only 4 percent to growers in southwest Florida.

Cucumbers

Several new cucumber production practices in Florida have resulted in increased yields for Florida growers. However, few changes have occurred in Sinaloa during the past 5 years.

Production Practices in Florida

Widespread use of gynoecious (producing only female flowers) cucumber varieties has contributed to yield increases in Florida. Use of gynoecious varieties potentially increases the number of fruits per plant since cucumbers develop from female flowers. "Floracuke" is a gynoecious variety commonly grown in southwest Florida.

One important change in cucumber production over the past 5 years is the widespread use of plastic mulch. Cucumber beds are made similar to tomato or pepper beds. Planting is done mostly by hand. A few seeds are planted every 9 inches and plants are later thinned to one to two plants per hill. The amount of seed required ranges from 1.5 to 2.5 pounds per acre.

Table 36—Bell peppers: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Florida		Sinaloa
	Palm Beach	Southwest	
	Dollars/acre		
Preharvest:			
Land rent	375.00	240.00	64.41
Machinery	513.00	473.23	147.00
Fertilizer	395.60	362.04	104.50
Pesticides	319.43	489.38	190.91
Labor and supervision	623.04	400.31	390.34
Interest	121.11	113.67	55.65
Other inputs 2/	657.41	741.55	427.87
Total preharvest	3,004.59	2,820.18	1,380.68
	Bushels/acre		
Yield	875	900	708.5
	Dollars/bushel		
Preharvest cost	3.43	3.13	1.95
Harvesting and packing:			
Picking and packing	3/ 1.15	4/ 2.21	3/ .95
Materials	.88	.73	1.06
Transporting and hauling	.20	.22	NA
Administrative	5/	5/	.10
Total harvesting and packing	2.23	3.16	2.11
Marketing:			
Selling (commissions)	.40	.30	1.46
Transporting	NA	NA	1.31
Fees, duties	NA	NA	.97
Total marketing	.40	.30	3.74
Total cost	6.06	6.59	7.80

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor and machinery.

4/ Includes labor, maintenance, building and machinery depreciation, interest on capital investments, miscellaneous materials, administration costs.

5/ Administrative costs for Florida are included in picking cost.

Cucumbers are typically fertilized at bed formation with approximately 300 pounds of nitrogen, 100 pounds of phosphorus, and 450 pounds of potassium per acre. A regular spray program is followed to control insects and prevent diseases. Copper and maneb or manzate are the most commonly used fungicides, while permethrin and methamidophos are the most often used insecticides. Weed control is usually undertaken through the use of herbicides. Paraquat along with chloramben and napropamide are the most common herbicides used.

Cucumbers are irrigated by seepage irrigation. Water is pumped into and from perimeter ditches which connect to field ditches set up every 10 to 12 beds. Water seeps into the soil laterally to create a water table near the root zone.

Harvesting begins 50 to 60 days after planting. Cucumbers are picked every 4-5 days, approximately three to six times. Cucumbers are placed into field buckets and dumped into palletized bins for hauling to the packing house. There they are washed, waxed, graded, and packed into 55-pound bushels.

Production Practices in Sinaloa

In Sinaloa, cucumbers are planted directly by tractor and planter in two close furrows every 8-10 inches. Each pair of rows is 2 meters (6'6") apart. The most common variety is the Poinsett. Cultural practices of cucumber production differ little from those of tomatoes. Stakes are placed every 2 meters, but use more cords and wires than tomatoes.

Staked cucumbers use two wands between the stakes. Some ground production is practiced in the final stages of the season. The picking and packing process for cucumbers is also similar to that of tomatoes.

Production Costs in Florida and Sinaloa

Preharvest costs were considerably lower for Sinaloan cucumber producers than for producers in southwest Florida (table 37). In the 1984/85 season, preharvest costs were only 19 percent of total costs for Sinaloan growers relative to 53 percent of total costs for southwest Florida growers. As with tomatoes and green peppers, the single largest preharvest cost in both areas was labor. Labor constituted 34 percent of preharvest costs for cucumbers in Sinaloa and 25 percent of cucumber preharvest costs in southwest Florida.

Harvesting and packing costs were also higher for southwest Florida growers than in Sinaloa. The majority of harvest and packing costs in both areas were for labor, machinery, and materials. The higher cost for materials in Sinaloa reflects the fact that most items used for packing vegetables, such as cartons, were imported from the United States.

Marketing costs for Sinaloan cucumber producers were, like the five other vegetables, higher than marketing costs for Florida producers. Marketing costs for Sinaloan growers were 54 percent of total costs compared with 3 percent for southwest Florida growers.

Cucumbers were the only vegetable considered in this study where total cost was lower for Sinaloan producers than for Florida producers.

Table 37—Cucumbers: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Southwest Florida	Sinaloa
	Dollars/acre	
Preharvest:		
Land rent	240.00	64.41
Machinery	384.74	129.20
Fertilizer	343.15	54.77
Pesticides	315.85	152.48
Labor and supervision	588.96	285.63
Interest	63.87	39.41
Other inputs 2/	408.22	105.58
Total preharvest	2,344.79	831.15
	Bushels/acre	
Yield	500	499
	Dollars/bushel	
Preharvest cost	4.69	1.66
Harvesting and packing:		
Picking and packing	3/ 2.87	4/ 1.29
Materials	.76	.86
Transporting and hauling	.24	.11
Administrative	5/	
Total harvesting and packing	3.87	2.26
Marketing:		
Selling (commissions)	.25	1.50
Transporting	NA	1.62
Fees, duties	NA	1.50
Total marketing	.25	4.62
Total cost	8.81	8.54

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor, maintenance, building and machinery depreciation, interest on capital investments, miscellaneous materials, administration costs.

4/ Includes labor and machinery.

5/ Administrative costs for Florida are included in picking cost.

Green Beans

Few changes occurred in Florida and Sinaloan green bean production practices during the past 5 years except for increasing use of mechanical bean pickers in Florida. Mechanical picking reduces labor costs but also results in reduced yields.

Production Practices in Florida

Budgets were developed for green bean (bush bean) production in both Dade and Palm Beach counties, the two primary winter fresh bean producing areas in Florida. Typical production practices differ somewhat between the two areas.

Beans in Dade County are generally mechanically planted at a spacing of 36 inches between rows without the use of raised beds, plastic mulch, or fumigation. Some growers plant beans as close as 26.5 inches between rows and apply increasing amounts of fertilizer. Yields on beans planted closer are as high as 200 (30-pound) bushels per acre while those planted at the usual row-spacing yield between 100 and 150 bushels per acre.

Palm Beach County beans are mechanically planted on raised beds which are usually fumigated once a year. A liquid fumigant is applied and no plastic mulch is used. Two rows of beans are planted 30 inches apart in the bed. Bed separation is 80 inches and the dimensions are similar to those for peppers or tomatoes.

Mechanical bean picking is increasing even though greater losses are incurred, compared with hand harvesting. A grower will choose to pick beans mechanically with a bean picker when prices are depressed or if fruit set is low. However, hand harvesting is still common and is readily used by smaller growers. Beans picked by hand are usually packed directly for market while machine-picked beans must first be sorted due to the high percentage of breakage during the picking process.

In both production areas, beans are planted two to three times a year. This practice is becoming more attractive as land values in these areas increase due to urbanization. Land rent costs per unit of production are reduced by planting more than one crop per year on the same land.

The most common bean variety used in both areas is "Triumph." Other varieties used are "Savor" and "Sprite." Between 60 to 85 pounds of seed are required per acre.

Fungicides and insecticides are applied on a regular basis. Beans are sprayed once over a period of about 7 weeks. The fungicides generally used are sulfur and maneb or manzate. Methomyl is the principal insecticide used in both areas, but bacillus thuringiensis and acephate are also used. Weeds are controlled by cultivation or the application of herbicides. However, some growers in both areas do not use any herbicides. EPTC and trifluralin are widely used.

Beans not packed in the field for market are hauled in bulk to the packing house where they are sorted mechanically for broken beans, stems, and leaves before packing.

Production Practices in Sinaloa

Sinaloa beans are planted by tractor 0.9 to 1 meter (3' to 3'3") between rows. The picking process is the most expensive of vegetable harvesting practices as it requires a large amount of labor to harvest beans into boxes or sacks. Apart from picking, beans are the least labor intensive of the vegetables considered in this study. They require little labor for planting and for applying fertilizer and chemicals.

Production Costs in Florida and Sinaloa

Preharvest costs for bean production were highest in Palm Beach County compared with Dade County and Sinaloa (table 38). In the 1984/85 season, preharvest costs in Dade County, Palm Beach County, and Sinaloa were 52, 60, and 19 percent of total costs.

Harvesting and packing costs were a significant proportion of total costs for Sinaloan and Dade County bean growers. Harvesting and packing costs were 47 percent of total costs for Sinaloan growers; 80 percent of the harvest costs were for picking and packing activities in the form of labor and machinery. As with the other vegetables considered in this study, Sinaloan bean producers face substantially higher marketing costs for exporting their beans to the U.S. market. Marketing costs were 33 percent of total costs for Sinaloan growers in the 1984/85 season, compared with 5 percent and 3 percent for Dade and Palm Beach growers.

Squash

Cultural practices for yellow squash in Florida differ somewhat from practices used for zucchini squash production in Sinaola.

Production Practices in Florida

There are a number of squash types grown in Florida. During the winter market period, production is greatest in Dade County, where yellow crookneck summer squash are grown almost exclusively.

Most squash growers in Dade County double crop squash, either planting squash after squash, squash after beans, or beans after squash. Double cropping is becoming more attractive to growers as land values increase due to urbanization. Land rent costs can be reduced by planting more than one crop per year on the same land.

The Dade County production system for growing squash is similar to the system used for bean production. Many squash growers are also bean growers. Most squash production is open culture; that is, no plastic mulch. Rows are mechanically planted 36 inches apart.

Recent increases in squash yields are due mostly to increased use of hybrid varieties. The most common variety used in Dade County is the very prolific "Dixie Hybrid." The amount of seed required ranges from 3-5 pounds per acre.

Most fertilizer is applied at planting with the remainder applied aerially. Usual rates are 75 pounds of nitrogen, 125 pounds of phosphorus, and 175 pounds of potassium per acre. Squash are sprayed every 5-7 days to control insects and prevent diseases. Commonly used insecticides include endosulfan

Table 38—Green beans: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Florida		Sinaloa
	Dade	Palm Beach	
	Dollars/acre		
Preharvest:			
Land rent	132.50	150.00	64.41
Machinery	106.48	191.78	95.38
Fertilizer	143.19	97.03	42.99
Pesticides	106.39	124.26	21.97
Labor and supervision	89.08	98.45	107.86
Interest	14.87	15.83	9.48
Other inputs 2/	130.50	92.47	118.98
Total preharvest	723.01	769.82	461.07
	Bushels/acre		
Yield	140	120	202.4
	Dollars/bushel		
Preharvest cost	5.16	6.42	2.28
Harvesting and packing:			
Picking and packing	3/ 3.08	4/ 2.64	3/ 4.61
Materials	1.17	1.11	.86
Transporting and hauling	.10	.10	NA
Administrative	5/	5/	.27
Total harvesting and packing	4.35	3.85	5.74
Marketing:			
Selling (commissions)	.50	.40	1.25
Transporting	NA	NA	1.31
Fees, duties	NA	NA	1.50
Total marketing	.50	.40	4.06
Total cost	10.01	10.67	12.08

NA denotes not applicable.

1/ More detailed costs are shown in the Appendix.

2/ Includes administrative and overhead costs.

3/ Includes labor and machinery.

4/ Includes labor, maintenance, building and machinery depreciation, interest on capital investments, miscellaneous materials, administration costs.

5/ Administrative costs for Florida are included in picking cost.

and parathion. Sulfur, triadimefon, and maneb or manzate are the most commonly used fungicides.

Squash fields are picked 8-12 times. The fruit is placed into bushel baskets or "tubs" and hauled by truck usually to a small 25-foot mobile packing shed located close to the field. There the squash are washed, sorted, and packed in 42-pound bushel crates and transported to the State Farmer's Market where most medium to small growers market their produce.

Production Practices in Sinaloa

Zucchini squash cultural practices in Sinaloa vary from the other vegetables. Seeds are planted manually every 30 cms (11"), with a row separation of 1.5 to 1.7 meters (5' to 5'6").

Due to the expansive growth of the plant above ground, only one tractor cultivation can take place. Other weeding and cultural practices are done by hand. Squash production also requires less fertilizer than that used with the other vegetables.

The picking and packing practices are almost the same as for tomatoes. Squash are picked in boxes or buckets, taken to the packing house, placed in the water tank, and then waxed. Squash are then selected and sorted before shipping. All Sinaloan squash production goes to the export market.

Production Costs in Florida and Sinaloa

Preharvest costs were 44 percent of the total cost for squash production in Dade County and 34 percent of the total cost of squash production in Sinaloa (table 39). The single highest preharvest cost in Dade County was fertilizer. However, land rent was also a significant cost. Labor and supervision constituted 31 percent of the preharvest cost to Sinaloan producers during the 1984/85 season, due mostly to the heavy use of labor in planting and other cultural practices.

Harvesting and packing costs were almost 28 percent higher for Dade County growers than for Sinaloan growers, while marketing costs were almost 81 percent higher for Sinaloan growers. Again, marketing costs in the form of transportation and fees, commissions, and duties were a significant proportion of the total cost of producing and exporting winter fresh vegetables to U.S. markets.

Eggplant

Increased eggplant yields in Florida during the winter season resulted from the adoption of new production technology. No significant changes in Sinaloan eggplant production practices have occured during recent years.

Production Practices in Florida

Winter eggplant production occurs mainly in Palm Beach County. Producers in that area have considerably increased yields through widespread use of "Classic," a prolific new eggplant variety. Eggplant growers in Palm Beach County also benefit from high production technology and a longer growing season than other areas in the State. Therefore, average eggplant yields in Palm Beach County are substantially higher than the State average.

Table 39—Squash: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Dade County	Sinaloa
	Dollars/acre	
Preharvest:		
Land rent	132.50	64.41
Machinery	101.79	74.42
Fertilizer	134.95	50.72
Pesticides	84.53	118.15
Labor and supervision	87.02	179.05
Interest	19.36	23.00
Other inputs 2/	150.79	60.79
Total preharvest	710.94	570.54
	Bushels/acre	
Yield	200	202.4
	Dollars/bushel	
Preharvest cost	3.55	2.81
Harvesting and packing:		
Picking and packing 3/	2.50	1.68
Materials	1.15	1.04
Transporting and hauling	.30	NA
Administrative	4/	.14
Total harvesting and packing	3.95	2.86
Marketing:		
Selling (commissions)	.50	.84
Transporting	NA	1.31
Fees, duties	NA	.45
Total marketing	.50	2.60
Total cost	8.00	8.27

NA denotes not applicable.
1/ More detailed costs are shown in the Appendix.
2/ Includes administrative and overhead costs.
3/ Includes labor and machinery.
4/ Administrative costs for Florida are included in picking cost.

Plants are grown on beds slightly wider than those used for either tomatoes or peppers. Containerized transplants are commonly used and plants are often transplanted by hand at around 5,125 plants per acre.

Heavy fertilizer application is used by some of the larger eggplant growers to maintain growth and fruit production throughout the eggplant's life cycle of about 150 days. Plants are sprayed 20 or more times with methomyl or dimethoate to control insects and maneb or copper to prevent diseases. Two herbicide applications are normally required for weed control; paraquat is most often used.

Eggplants are irrigated using seepage irrigation. Water is pumped into and from perimeter ditches which connect to field ditches set up every 10-12 beds.

Eggplants are picked once a week for 12-15 weeks. Mobile packing sheds (mule trains) are used for packing eggplant in the field. The fruit is placed in plastic buckets and placed on a conveyor belt attached at the front of the mule train and spanning a distance of up to 15 rows. After sorting and packing for market, workers load eggplants onto a truck pulled behind the mule train.

Production Practices in Sinaloa

The use of greenhouses for growing transplants is widespread for eggplant production in Sinaloa. "Black Beauty" is the most common variety grown. Plants are transplanted into fields after 30 days in the greenhouse. They are placed every 40 cms (1'3") in rows separated 1.9 to 2 meters (6' to 6'6").

Eggplant staking practices are similar to tomato and bell pepper practices, but wands are being eliminated to reduce costs. The fruit is picked in large boxes or buckets and placed in trucks or in fiberglass tanks to be transported to the packing house. Some growers use mobile packing sheds in the field.

Production Costs in Florida and Sinaloa

Preharvest costs were 45 percent and 22 percent of the total cost of eggplant production in Palm Beach County and Sinaloa (table 40). Of the preharvest costs, machinery constituted the highest cost to Palm Beach County producers, while labor and supervision costs were most significant to Sinaloan producers.

Harvesting and packing costs were only 34 percent of the total costs to Sinaloan producers compared with 46 percent of total costs for Florida producers. As with the other vegetables, marketing costs were a significant proportion (45 percent) of the total cost of producing eggplant in Sinaloa for export to the United States.

Cost Changes in Florida and Sinaloa

The total costs of producing each of the six vegetables considered in this study for five seasons (1967/68, 1970/71, 1973/74, 1978/79, 1984/85) are summarized in table 41. Changes in the cost competitive positions of each area are evident by comparing the change in each area's total cost from season to season. Producers in the area maintaining the lowest rate of increase or highest rate of decrease in total cost have a cost advantage over producers in the other area. For example, total cost for production of vine-ripe tomatoes in Sinaloa increased 28 percent between the 1978/79 and 1984/85 production

Table 40—Eggplant: Production and marketing costs, selected areas of Florida and Mexico, 1984/85 1/

Item	Palm Beach County	Sinaloa
	Dollars/acre	
Preharvest:		
Land rent	375.00	64.41
Machinery	604.76	104.32
Fertilizer	478.50	96.61
Pesticides	533.53	244.02
Labor and supervision	531.68	333.08
Interest	166.95	48.63
Other inputs 2/	656.43	274.42
Total preharvest	3,346.85	1,206.49
	Bushels/acre	
Yield	2,150.00	1,012.10
	Dollars/bushel	
Preharvest cost	1.56	1.19
Harvesting and packing:		
Picking and packing 3/	.51	.81
Materials	.87	.96
Transporting and hauling	.23	NA
Administrative	4/	.09
Total harvesting and packing	1.61	1.86
Marketing:		
Selling (commissions)	.30	.64
Transporting	NA	1.31
Fees, duties	NA	.50
Total marketing	.35	2.45
Total cost	3.47	5.50

NA denotes not applicable.
1/ More detailed costs are shown in the Appendix.
2/ Includes administrative and overhead costs.
3/ Includes labor and machinery.
4/ Administrative costs for Florida are included in picking cost.

Table 41—Production costs for growing, harvesting, and marketing fresh winter tomatoes, peppers, cucumbers, green beans, eggplants, and squash, Florida and Mexico, 1967/68 to 1984/85

Commodity and cost item	1967/68 1/		1970/71 1/		1973/74 1/		1978/79 2/		1984/85	
	Florida 3/	Mexico 4/	Florida 3/	Mexico 4/	Florida 3/	Mexico 4/	Florida 3/	Mexico 4/	Florida 3/	Mexico 4/
	Dollars/25-pound equivalent									
Tomatoes:										
Vine-ripened—										
Preharvest	—	0.38	—	0.40	—	0.78	—	1.04	—	1.78
Harvest, pack, sell	—	.78	—	.83	—	1.45	—	2.12	—	2.07
Export costs 5/	NA	1.28	NA	1.30	NA	1.53	NA	1.63	NA	2.28
Total	—	2.44	—	2.53	—	3.76	—	4.79	—	6.13
Mature green, ground— 6/										
Preharvest	0.78	—	0.88	—	2.16	—	2.35	—	2.61	2.72
Harvest, pack, sell	.85	—	1.17	—	1.83	—	2.43	—	3.17	2.07
Export costs	NA	—	NA	—	NA	—	NA	—	NA	2.28
Total	1.63	—	2.05	—	3.99	—	4.78	—	5.78	7.07
Mature green, staked— 6/										
Preharvest	—	—	—	—	2.21	—	2.38	—	2.90	—
Harvest, pack, sell	—	—	—	—	1.96	—	2.28	—	3.05	—
Total	—	—	—	—	4.17	—	4.66	—	5.95	—
Mature green, staked 7/										
Preharvest	—	—	—	—	—	—	1.88	—	2.14	—
Harvest, pack, sell	—	—	—	—	—	—	2.23	—	2.93	—
Total	—	—	—	—	—	—	4.11	—	5.07	—
	Dollars/bushel									
Bell peppers:										
Preharvest	.95	1.30	1.01	.74	2.16	.94	2.98	1.79	8/ 3.28	1.95
Harvest, pack, sell	1.69	1.19	2.11	1.22	2.21	1.45	2.83	2.10	8/ 2.68	2.11
Export costs	NA	1.79	NA	1.80	NA	1.62	NA	2.61	NA	3.74
Total	2.64	4.28	3.12	3.76	4.37	4.01	5.81	6.50	8/ 6.49	7.80
Cucumbers:										
Preharvest	.82	1.06	.89	.87	2.68	1.58	3.53	1.99	4.69	1.66
Harvest, pack, sell	1.99	1.28	2.48	1.30	2.66	1.67	3.38	2.08	4.12	2.26
Export costs	NA	2.67	NA	2.70	NA	2.87	NA	3.30	NA	4.62
Total	2.81	5.01	3.37	4.87	5.34	6.12	6.91	7.37	8.81	8.54
Green beans:										
Preharvest	—	—	—	—	—	—	—	—	9/ 5.70	2.28
Harvest, pack, sell	—	—	—	—	—	—	—	—	9/ 4.60	5.74
Export costs	NA	—	NA	—	NA	—	NA	—	NA	4.06
Total	—	—	—	—	—	—	—	—	9/ 10.30	12.08
Eggplants:										
Preharvest	.77	.31	.80	.33	1.87	0.72	2.76	1.23	1.56	1.19
Harvest, pack, sell	1.18	.96	1.58	.98	1.33	1.10	1.84	1.67	1.91	1.86
Export costs	NA	1.03	NA	1.07	NA	1.58	NA	1.95	NA	2.45
Total	1.95	2.30	2.38	2.38	3.20	3.40	4.60	4.85	3.47	5.50
Squash:										
Preharvest	—	—	—	—	—	—	—	—	3.55	2.81
Harvest, pack, sell	—	—	—	—	—	—	—	—	4.45	2.86
Export costs	NA	—	NA	—	NA	—	NA	—	NA	2.60
Total	—	—	—	—	—	—	—	—	8.00	8.27

— denotes not available for this season.
NA denotes not applicable.
1/ Production costs from (8, 11).
2/ Production costs developed in (14).
3/ F.o.b. the packing house.
4/ F.o.b. Nogales.
5/ Includes cost of transport from Sinaloa to Nogales, and export fees to Nogales. Export costs are not applicable to Florida.
6/ Winter crop.
7/ Spring crop.
8/ Weighted average between Palm Beach County and southwest Florida.
9/ Weighted average between Dade County and Palm Beach County.

seasons. During the same period, the total cost of producing mature green ground tomatoes in Dade County, and mature green staked tomatoes in southwest Florida and the Palmetto-Ruskin area, increased 21 percent, 28 percent, and 23 percent. These figures indicate that Florida tomato producers have maintained a cost advantage over Sinaloan tomato producers.

Florida producers also improved their cost competitive position in pepper and eggplant production, but the cost competitive position of cucumber producers weakened. Florida cucumber producers experienced a 27-percent increase in total costs between the 1978/79 and 1984/85 seasons compared with a 16-percent increase for cucumber growers in Sinaloa. Moreover, in terms of total costs per bushel, Florida cucumber growers now operate at a cost disadvantage to Sinaloan producers. Comparative data between the five seasons were not available for green beans and squash.

Relative cost changes between the two areas for the same five seasons are assessed in table 42 by the ratio of Sinaloan to Florida costs. A value less than 1.0 suggests that Sinaloa had the cost advantage; a value greater than 1.0 suggests that Florida had the cost advantage.

The ratios of Sinaloan to Florida costs for winter staked and ground tomatoes show steady increases since the 1973/74 production season. The ratio for winter staked tomatoes in southwest Florida increased from 0.9 in 1973/74 to 1.03 in 1984/85, while the ratio for ground tomatoes in Dade County increased from 0.94 to 1.06 over the same period. However, the ratio for spring staked tomatoes in the Palmetto-Ruskin area shows the largest increase between 1978/79 and 1984/85, rising from 1.16 to 1.20. The strengthening of the Sinaloan to the Palmetto-Ruskin area ratio may reflect the upward trend in

Table 42—Ratio of Sinaloa costs to Florida costs for producing fresh winter tomatoes, bell peppers, cucumbers, green beans, eggplants, and squash, selected years

Commodity	1967/68 1/	1970/71 1/	1973/74 1/	1978/79 1/	1984/85 2/
			Ratio		
Tomatoes:					
Staked 3/	—	—	0.902	1.028	1.030
Ground 3/	1.500	1.234	.942	1.002	1.061
Staked 4/	—	—	—	1.165	1.209
Peppers	1.621	1.205	.918	1.119	1.202
Cucumbers	1.783	1.445	1.146	1.067	.969
Green beans	—	—	—	—	1.173
Eggplant	1.179	1.000	1.062	1.054	1.585
Squash	—	—	—	—	1.030

— denotes data not available for this season.

1/ Computed from (14).

2/ Calculated as (Sinaloa cost)/(Florida cost) as shown in table 41. A value less than 1.0 suggests that Mexico had the cost advantage; a value greater than 1.0 suggests that Florida had the cost advantage.

3/ Winter production.

4/ Spring production.

tomato production in the Palmetto-Ruskin area over the past five seasons. Area planted increased 28 percent between 1979/80 and 1983/84. The increase in area planted is consistent with the cost advantage enjoyed by Florida producers during the spring period.

The cost ratios for the other vegetables have also strengthened in favor of Florida, with the exception of cucumbers. The ratio for cucumbers shows a continuous decline, from 1.783 in the 1967/68 season to 0.969 in the 1984/85 season. Most important, Florida lost its cost advantage in cucumber production between 1978/79 and 1984/85. Significantly increased labor use for plastic mulch bedding and land rents for Florida cucumber production have contributed greatly to this situation.

COMPETITIVE ADVANTAGE FOR 1984/85

The budgets discussed in the previous section indicate that Florida had a production and marketing cost advantage for five of the six vegetables analyzed. Cost competitive positions of Florida and Mexico are further assessed in this section by comparing total costs of delivery to selected major U.S. markets. F.o.b. prices for each of the six vegetables in Florida and Nogales are also compared to evaluate price advantages. The sum of the price advantage and the cost advantage determines the net competitive position of producers in each area.

Costs Delivered to Terminal Markets

Transportation costs were added to the Florida and Sinaloan production and marketing costs to derive comparable cost estimates for each of the six vegetables delivered to Chicago and New York City markets (table 43). The cost of transportation during the production season from Florida and Nogales to both of the major U.S. markets rose from $0.98 per mile in 1980 to $1.15 per mile in 1985, an 18-percent increase (13, 14).

Florida retained cost advantages in Chicago and New York City for all vegetables considered since the 1973/74 season. However, Florida's cost competitive position in winter staked and ground-grown tomatoes and cucumbers deteriorated slightly between 1978/79 and 1983/84. This deterioration may, in part, reflect the severity of damage to these temperature-sensitive vegetables caused by freezing weather in Florida during the past few production seasons. Freezes in Florida permitted Sinaloa to increase shipments and periodically gain additional market share in the United States (see figs. 18, 19, 20, and 21). Heavy replanting of tomatoes for spring harvest, helping to offset winter crop losses, improved Florida's market share for spring tomato production (see fig. 26). Florida cucumber production is important mainly during the fall and spring as Sinaloa has a decided climatic advantage for producing cucumbers during the midwinter months.

Florida's cost competitive position in bell peppers dramatically improved, especially in the New York City markets. Florida increased its cost advantage in shipping peppers to New York City from a low of $0.06 in 1973/74 to $2.37 in 1983/84. A similar situation occurred for Florida-produced eggplant.

Costs of shipping vegetables from south Florida to markets in Chicago and New York City are about equal. However, the cost of shipping from Nogales is substantially higher for vegetables with a New York City destination. Therefore, Florida has remained the primary supplier of fresh winter

Table 43—Total costs of production, marketing, and delivery to Chicago and New York for fresh winter vegetables

Crop and producing area	Chicago					New York				
	1967/68 1/	1970/71 1/	1973/74 2/	1978/79 2/	1984/85 3/	1967/68 1/	1970/71 1/	1973/74 2/	1978/79 2/	1984/85 3/
	Dollars/25-pound equivalent									
Tomatoes:										
Florida mature green—										
Southwest	—	—	5.03	5.68	6.93	—	—	5.03	5.65	6.94
Dade County	—	—	4.85	5.81	6.83	—	—	4.85	5.78	6.82
Palmetto-Ruskin	—	—	—	5.14	5.97	—	—	—	5.11	5.99
Mexico vine-ripe	3.20	3.37	4.77	6.18	7.26	3.60	3.94	5.22	6.68	7.97
Difference— 4/										
Southwest	—	—	-.26	.50	.33	—	—	.19	1.03	1.03
Dade County	—	—	-.08	.37	.43	—	—	.37	1.90	1.15
Palmetto-Ruskin	—	—	—	1.04	1.29	—	—	—	1.57	1.98
	Dollars/bushel									
Bell peppers:										
Florida	3.54	4.12	5.67	7.21	7.37	3.44	4.02	5.57	7.09	4/ 7.37
Mexico	5.34	5.02	5.15	8.30	9.18	5.90	5.89	5.63	8.95	9.74
Difference 4/										
Florida	1.80	.90	-.52	1.09	1.81	2.46	1.87	.06	1.86	2.37
Cucumbers:										
Florida	3.96	4.67	7.09	8.87	11.15	3.91	4.57	6.99	8.76	11.16
Mexico	6.32	6.34	7.86	10.02	11.66	7.01	7.37	8.64	10.99	12.92
Difference 4/										
Florida	2.36	1.67	.77	1.15	.51	3.10	2.80	1.65	2.23	1.76
Green beans:										
Florida	—	—	—	—	6/ 11.81	—	—	—	—	6/ 11.79
Mexico	—	—	—	—	13.94	—	—	—	—	14.70
Difference 4/										
Florida	—	—	—	—	2.13	—	—	—	—	2.91
Eggplant:										
Florida	2.90	3.43	4.55	6.05	4.91	2.80	3.33	4.45	5.93	4.89
Mexico	3.41	3.67	4.59	6.70	7.37	3.99	4.57	5.07	7.35	8.13
Difference 4/										
Florida	.51	.24	.04	.65	2.46	1.19	1.24	.62	1.42	3.24
Squash:										
Florida	—	—	—	—	9.97	—	—	—	—	9.95
Mexico	—	—	—	—	10.72	—	—	—	—	11.72
Difference										
Florida	—	—	—	—	.75	—	—	—	—	1.77

— denotes data not available for this season.

1/ (8).

2/ (11).

3/ Transportation costs based on the January through May 1984 average in unpublished monthly truck rates for owner-operators collected by the Office of Transportation, USDA.

4/ Difference between Mexico and Florida costs.

5/ Simple average of Palm Beach County costs and southwest Florida costs.

6/ Simple average of Palm Beach County costs and Dade County costs.

vegetables to New York markets and also retains its greatest cost advantage over Mexico in the Northeast for each of the six vegetables. Buyers in the Northeast may substitute Mexican-produced vegetables when Florida production is interrupted by adverse weather conditions and supplies are reduced.

Prices Received in Florida and Mexico

An assessment of prices received is also necessary in determining the competitive position of vegetable producers in each area. A short-term competitive advantage may be obtained by producers in an area who are able to: (1) ship larger quantities of goods during periods of high prices even though production and marketing costs may be higher relative to another area, or (2) receive premium prices from buyers relative to that received in another area, despite higher production costs. The heaviest competition between Florida and Sinaloa occurs between December and April when both areas are in full winter vegetable production and the risk of damage to Florida production from freezes is greatest. Production disruptions which decrease domestic supply from Florida may temporarily increase prices and provide Sinaloan producers with a price advantage.

Simple and weighted averages of prices received f.o.b. at the packing house in Florida and at Nogales were calculated for the six vegetables (tables 44 and 45). The simple averages in table 44 show the average prices received in each area from marketing vegetables during any week of the production season. The weighted average prices in table 45 reflect the effect that the volume of shipments has on the season average price. Compared with the simple average price, a substantially higher weighted average indicates that shipments were heavy during periods of high prices. In contrast, a lower weighted average price suggests heavy volumes of shipments occurred during periods of low prices.

During any given week in the production season, Florida tomato prices tend to be higher than Mexico tomato prices. Examination of table 44 shows the six season simple average price for Florida tomatoes was $7.53 over the period 1978/79 through 1983/84. Sinaloan tomatoes were marketed in Nogales for an average price of $7.40 over the same period. Florida also received higher prices for cucumbers and eggplant.

A breakdown of prices by production area in Florida is useful in assessing the prices received in each area for tomatoes relative to that received for Mexican tomatoes in Nogales. Therefore, weekly average tomato prices were weighted by weekly tomato shipments of all maturities from each area in Florida for comparison with the weighted average tomato prices for all maturities in Nogales (table 45). The weighted average prices indicate that Sinaloa had a price advantage for tomatoes over all three of the major winter fresh tomato producing areas in Florida. Florida prices averaged higher than Mexican prices over the 1973/74 through 1977/78 period. This turnaround in price advantage suggests that Sinaloan producers were able to ship larger quantities of tomatoes into U.S. markets during periods of high prices resulting from adverse weather conditions affecting yields in Florida. Sinaloa also had a price advantage for peppers, cucumbers, green beans, and squash.

Net Competitive Advantage

Florida had a cost advantage in tomato, bell pepper, green bean, eggplant, and squash production during the 1984/85 season while Sinaloa had a cost advantage

Table 44—Simple average f.o.b. prices received by Florida and west Mexico growers for fresh winter vegetables 1/

Crop and production area	Simple average 2/ 1973/74 - 1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1978/79 - 1983/84
				Dollars/25-pound carton equivalent				
Tomatoes: 3/								
Florida	6.53	7.06	6.24	9.77	6.14	8.02	7.97	7.53
Mexico	6.28	6.69	5.59	9.90	7.08	8.28	6.88	7.40
				Dollars/bushel				
Bell peppers: 4/								
Florida	8.86	7.09	9.41	14.25	9.53	14.07	14.24	11.43
Mexico	10.32	9.91	9.55	21.63	11.76	16.39	12.31	13.59
Cucumbers: 4/								
Florida	10.44	9.64	12.12	13.08	13.54	16.33	12.84	12.93
Mexico	10.34	9.92	10.05	12.35	13.26	15.88	13.10	12.43
Green beans: 4/								
Florida	—	8.82	9.23	15.36	12.29	12.23	12.10	11.67
Mexico	—	10.60	11.01	17.81	19.16	14.07	13.88	14.42
Eggplant: 4/								
Florida	—	4.93	4.51	7.32	7.03	8.41	8.00	6.70
Mexico	—	—	3.86	6.42	5.06	5.75	5.39	5.30
Squash: 4/								
Florida	—	10.91	8.82	13.18	10.35	15.03	12.41	11.78
Mexico	—	10.51	12.40	20.55	15.92	17.23	12.81	14.90

— denotes data not available for this season.

1/ Calculated from data obtained from (3, 5, 7).

2/ From (14).

3/ Computed by dividing the sum of all the season's weekly prices quoted for all maturities in Florida and Nogales during December through June by the number of weeks.

4/ Computed by dividing the sum of all the season's weekly prices quoted in Florida and Nogales during December through April by the number of weeks.

Table 45—Weighted average f.o.b. prices received by Florida and west Mexico growers for fresh winter vegetables 1/

Crop and production area	Weighted average 2/ 1973/74-1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1978/79 - 1983/84
	Dollars/25-pound carton equivalent							
Tomatoes: 3/								
Florida—								
Southwest	—	5.83	5.20	5.77	5.47	7.41	6.42	6.02
Dade County	—	6.09	4.99	8.16	6.33	7.81	8.62	7.00
Palmetto-Ruskin	—	5.07	5.66	4.19	5.46	6.98	6.52	5.65
Total	6.08	5.66	5.28	6.04	5.75	7.40	7.19	6.22
Mexico	5.94	6.41	5.08	11.53	6.72	8.59	7.48	7.64
	Dollars/bushel							
Bell peppers: 4/								
Florida	7.42	6.94	9.62	11.70	8.47	13.60	10.79	10.19
Mexico	10.09	9.50	8.82	22.33	12.43	16.07	12.80	13.66
Cucumbers: 4/								
Florida	6.81	9.02	13.25	12.24	10.21	14.58	11.66	11.83
Mexico	10.13	9.44	9.23	12.38	13.81	15.55	12.96	12.23
Green beans: 4/								
Florida	—	8.35	8.99	12.71	11.16	11.30	9.78	10.38
Mexico	—	10.49	10.85	17.86	25.37	13.32	13.73	15.27
Eggplant: 4/								
Florida	3.85	4.65	4.07	6.35	6.45	6.61	6.32	5.74
Mexico	4.35	—	3.98	6.79	5.28	6.04	5.58	5.53
Squash: 4/								
Florida	—	10.53	8.51	11.38	10.16	13.93	10.90	10.90
Mexico	—	10.23	12.28	20.42	15.96	16.96	12.40	14.71

— denotes data not available for this season.

1/ Calculated from data obtained from (3, 5, 7).

2/ From (14).

3/ Computed by weighting the weekly average f.o.b. price for all maturities in Florida and Nogales during December through June by the corresponding quantities sold each week in each area.

4/ Computed by weighting the weekly average f.o.b. price in Florida and Nogales during December through April, by the corresponding quantities sold during the week.

in cucumber production. At the same time, Sinaloa was found to have a price advantage for tomatoes, peppers, cucumbers, green beans, and squash. These results were applied in the determination of the net competitive positions of Florida and Mexico in the winter fresh vegetable market for the six vegetables.

Florida's net competitive advantage was calculated as the sum of the cost advantage and the price advantage (table 46). A positive number represents a net competitive advantage for Florida, while a negative number indicates a disadvantage for Florida or a net competitive advantage for Mexico. Net competitive advantage was calculated using both simple and weighted average prices. However, use of weighted average prices appears to produce more significant results due to the consideration of the shipment-price relationship.

The net competitive advantage calculated using simple average prices indicates that Florida has a seasonal net competitive advantage in the production of tomatoes, cucumbers, and eggplant. However, the net competitive advantage calculated using the weighted average prices indicates that Sinaloa has achieved a seasonal net competitive advantage in the production of all vegetables considered, with the exception of eggplant. These results indicate that a change has occurred in the competitive positions of Florida and Sinaloa since a similar study was conducted by Zepp and Simmons for the 1978/79 season (14). Evaluating the competitive positions of tomatoes, peppers, cucumbers, and eggplants for producers in both areas, the 1978/79 study found that Florida retained a net competitive advantage for tomatoes and cucumbers using simple average prices, and a net competitive advantage only for tomatoes, using weighted average prices.

The loss of competitive advantage for tomatoes between 1978/79 and 1984/85 can be attributed to the freezing weather conditions in Florida, which temporarily reduced supplies and increased prices during four of the last five production seasons. While the cost advantage for producing tomatoes in Florida between 1978/79 and 1984/85 increased by only $0.02, $0.34, and $0.25 for producers in the southwest, Dade County, and the Palmetto-Ruskin area, the price advantage for producers in these areas dropped by $1.77, $0.47, and $1.91. Sinaloan producers increased tomato shipments and captured a greater share of the U.S. winter tomato market during the December through April period since the 1981/82 season (see figs. 18 and 22). The large decrease in price advantage for Palmetto-Ruskin producers of spring tomatoes has resulted from the large amount of tomatoes that have entered the market late in the season because of earlier production disruptions in southwest Florida and Dade County.

Eggplant is the only winter fresh vegetable where Florida producers retained both a cost and a price advantage in 1984/85. Net competitive advantage increased $0.71 since 1978/79, and shifted the net competitive advantage in favor of Florida. While the price advantage for Florida eggplant producers decreased from $0.26 in 1978/79 to $0.21 in 1984/85, the cost advantage increased from $0.26 to $2.03 in the same period. More widespread use of higher yielding eggplant varieties in Florida has contributed to the increase in cost advantage.

Sinaloa producers retained the net competitive advantage in cucumber and bell pepper production between 1978/79 and 1984/85. However, the net competitive advantage held by Sinaloan cucumber producers decreased from $2.86 in 1978/79 to $0.67 in 1984/85, mainly because of decreased price advantage between the two seasons. While cost advantage increased from $0.69 in 1978/79 to $1.31 in

Table 46—Net competitive advantage for Florida in supplying fresh winter vegetables to U.S. markets, 1984/85 1/

Cost component	Winter tomatoes		Spring tomatoes	Peppers	Cucumbers	Green beans	Eggplant	Squash
	Southwest	Dade Co.	Pal.-Rusk.					
	Dollars/25-pound carton			Dollars/bushel				
Simple average prices:								
Price advantage 2/	0.13	0.13	0.13	-2.16	0.50	-2.75	1.40	-3.12
Cost advantage 3/	.18	.35	1.06	1.31	-.27	1.78	2.03	.27
Net advantage 4/	.31	.48	1.19	-.85	.23	-.97	3.43	-2.85
Weighted average prices:								
Price advantage 2/	-1.62	-.64	-1.99	-3.47	-.40	-4.89	.21	-3.81
Cost advantage 3/	.18	.35	1.06	1.31	-.27	1.78	2.03	.27
Net advantage 4/	-1.44	-.29	-.93	-2.16	-.67	-3.11	2.24	-3.54

1/ A postiive number represents a net competitive advantage for Florida; a negative number represents a net competitive advantage for Mexico.

2/ Calculated as Florida price minus Mexican price; six-season average (1978/79-1983/84).

3/ Calculated as Mexican cost minus Florida cost (1983/84 season). For tomatoes, the comparison is between Florida matures green tomatoes and Mexican vine-ripes.

4/ Sum of price advantage and cost advantage.

Source: Calculated from tables 41, 44, and 45.

1984/85 in favor of Florida bell pepper producers, price advantage decreased by $0.80, thus increasing the net competitive advantage held by Sinaloan bell pepper producers from $1.98 in 1978/79 to $2.67 in 1984/85.

Comparative figures for squash and green beans were unavailable for the 1978/79 season, but Sinaloan producers held the net competitive advantage in producing these two vegetables in 1984/85. It appears that freezing weather conditions in Florida have sufficiently affected price to overshadow the cost advantages obtained by Florida green bean and squash producers.

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APPENDIX A
REGULATORY BULLETIN No. 1
1984-85

HANDLING REGULATIONS

During the period October 10, 1984, through midnight June 15, 1985, no person shall handle any lot of tomatoes for shipment outside the regulated area unless they meet the requirements of Paragraph (a) or are exempted by Paragraph (b) or (d).

(a) GRADE, SIZE, CONTAINER AND INSPECTION REQUIREMENTS

(1) GRADE. Tomatoes shall be graded and meet the requirements for U.S. No. 1, U.S. Combination, U.S. No. 2 or U.S. No. 3, of the U.S. Standards for Grades of Fresh Tomatoes. When not more than 15 percent of tomatoes in any lot fail to meet the requirements of U.S. No. 1 grade and not more than one-third of this 15 percent (or 5 percent) are comprised of defects causing very serious damage, including not more than one percent of tomatoes which are soft or affected by decay, such tomatoes may be shipped and designated at least 85 percent U.S. No. 1 grade.

(2) SIZE. (i) Tomatoes shall be at least 2-5/32 inches in diameter and be sized with proper equipment in one or more of the following ranges of diameters. Measurements of diameters shall be in accordance with the methods prescribed in Paragraph 51.1859 of the U.S. Standards for Grades of Fresh Tomatoes.

Size Classification	Inches	
	Min. Diameter	Max. Diameter
7x7	2 5/32	2 10/32
6x7	2 8/32	2 18/32
6x6	2 16/32	2 26/32
5x6 and larger	2 24/32	

(ii) Tomatoes of designed sizes may not be commingled unless they are over 2-24/32 inches in diameter and each container or lid shall be marked to indicate the designated size.

(iii) Only numerical terms may be used to indicate the above listed size designations on containers of tomatoes, except when tomatoes are commingled the containers can be marked 5X6 & Lgr.

(iv) To allow variations incident to proper sizing, not more than a total of ten (10) percent, by count, of the tomatoes in any lot may be smaller than the specified minimum diameter or larger than the maximum diameter.

(3) CONTAINERS. (i) Tomatoes shall be packed in containers of 20 or 25 pounds designated net weights and comply with the requirements of Paragraph 51.1863 of the U.S. Tomato Standards.

(ii) Each container or lid shall be marked to indicate the designated net weight and must show the name and address of the registered handler (as defined in Paragraph 966.7) in letters at least one-fourth (1/4) inch high and such containers must be packed at the registered handler's facilities.

(iii) The containers in which tomatoes are packed must be clean and bright in appearance without marks, stains, or other evidence of previous use. (New boxes).

(4) INSPECTION: Tomatoes shall be inspected and certified pursuant to the provisions of Paragraph 966.60 of the Florida Tomato Marketing Agreement and Order. Each handler who applies for inspection shall register with the Committee pursuant to Paragraph 966.113. Handlers shall pay assessments as provided in Paragraph 966.42. Evidence of inspection must accompany truck shipments.

(b) SPECIAL PURPOSE SHIPMENTS

The requirements of Paragraph (a) of this section shall not be applicable to shipments of tomatoes for canning, relief or charity, certain experimental purposes or export if the handler thereof complies with the safeguard requirements of Paragraph (c) of this section. Shipments for canning are also exempt from the assessment requirements of this part.

(c) SAFEGUARDS

Each handler making shipments of tomatoes for canning, relief or charity, certain experimental purposes, or export in accordance with Paragraph (b) of this section shall:

(1) Apply to the Committee and obtain a Certificate of Privilege to make such shipments.

(2) Prepare on forms furnished by the Committee a report in quadruplicate on such shipments authorized in Paragraph (b) of this section.

(3) Bill or consign each shipment directly to the designated applicable receiver.

(4) Forward one copy of such report to the Committee office and two copies to the receiver for signing and returning one copy to the Committee office. Failure of the handler or receiver to report such shipments by signing and returning the applicable report to the Committee office within ten days after shipments may be cause for cancellation of such handler's certificate and/or receiver's eligibility to receive further shipments pursuant to such certificate. Upon cancellation of any such certificate, the handler may appeal to the Committee for reconsideration.

(d) EXEMPTIONS

(1) For Types. The following types of tomatoes are exempt from these regulations: Elongated types commonly referred to as pear shaped or paste

tomatoes and including but not limited to San Marzano, Red Top and Roma varieties; cerasiform type tomatoes commonly referred to as cherry tomatoes, hydroponic tomatoes; and greenhouse tomatoes.

(2) For Minimum Quantity. For purposes of these regulations each person subject thereto may handle up to but not to exceed 50 pounds of tomatoes per day without regard to the requirements of these regulations, but this exemption shall not apply to any shipment or any portion thereof of over 50 pounds of tomatoes.

(3) For Special Packed Tomatoes. Tomatoes resorted, regraded and repacked by a handler who has been designated as a "Certified Tomato Repacker" by the Committee are exempt from the tomato grade classifications of Paragraph (a) (1); the size classifications of Paragraph (a) (2) except that the tomatoes hall be at least 2-5/32 inches in diameter; and the container weight requirements of the Paragraph (a) (3); if such tomatoes comply with the inspection requirements of Paragraph (a) (4).

(4) For Varieties. Upon recommendation of the Committee, varieties of tomatoes that are elongated or otherwise misshapen due to adverse growing conditions may be exempted by the Secretary from the provisions of Paragraph (a) (2) Size.

(e) DEFINITIONS

"Hydroponic tomatoes" means tomatoes grown in solution without soil; "greenhouse tomatoes" means tomatoes grown indoors. A "Certified Tomato Repacker" is a repacker of tomatoes in the regulated area who has the facilities for handling, regrading, resorting, and repacking tomatoes into consumer size packages and has been certified as such by the Committee. "Adequate facilities" as regraded to in the 966.113 are defined as those being in a permanent location with non-portable equipment for the proper grading, sizing and packing of tomatoes. "U.S. Tomato Standards" means the revised United States Standards for Grades of Fresh Tomatoes (Paragraphs 51.1855-51.1877) effective December 1, 1973, as amended, or variations thereof specified in this section. Other terms in this section shall have the same meaning as when used in Marketing Agreement No. 125, as amended, and this part, and the U.S. Tomato Standards.

(f) ASSESSMENTS

Billings for assessments will be made weekly based upon copies of Inspection Certificates which will be supplied to the Florida Tomato Committee office by the Federal-State Inspection Service.

Appendix table 1—Mature green ground tomatoes: Production and marketing costs in Dade County, Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Frost protection	Pipe, sprinklers: $1,500/acre on 25 percent of acreage; amount @ 12 percent for 5 years	104.03
Land rent	$150/gross acre; 83-percent usable area	180.00
Clean wall	Custom hire upkeep: $15/acre	15.00
Dump fee	Plastic disposal: $4/acre	4.00
Gases	Oxygen and propane	6.00
Fertilizer	153 lbs. nitrogen; 352 lbs. phosphate; 343 lbs. potash	311.13
Soil fumigant	200 lbs. MC 75:25 @ $1/lb.	200.00
Plastic mulch	2.5 rolls @ $65/roll	162.50
Seed	5 ozs. @ $25/oz.	125.00
Plug mix	20 cubic foot @ $1.75/cubic foot	35.00
Insecticides	2.5 gals. Monitor; 5 pts. Ambush; 1.25 gals. Lannate; 2 qts. Azadrin	225.38
Fungicides	33 lbs. Maneb; 36 lbs. Copper; 2 qts. Bravo	147.10
Bactericide	8 ozs. strephtomycin @ $0.50/oz.	4.00
Herbicide	1 qt. Paraquat; 20 fl. oz. Sencor	18.25
Sticker	1 gal. @ $18.00/gal.	18.00
Labor		338.90
Machinery—		
Custom services		50.00
Operation		144.33
Ownership		151.49
Supervision	7 percent of above preharvest costs	156.81
Administrative	4.5 percent of above preharvest costs	107.86
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	105.20
Total preharvest		2,609.98
		Dollars/ carton
Preharvest cost per 25-pound carton	1,000 cartons/acre	2.61
Harvesting and packing:		
Picking	1.9 cents/lb. harvested; 75-percent packout	.63
Hauling	0.2 cent/lb. harvested; 75-percent packout	.07
Packing	Labor, machinery, supplies	1.74
Carton box		.58
Total harvesting and packing		3.02
Marketing:		
Selling		.15
Total marketing		.15
Total cost		5.78

Appendix table 2—Mature green staked tomatoes: Production and marketing costs in the Palmetto-Ruskin area, Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$50/gross acre; 60-percent usable area	83.00
Irrigation	$100/acre amortized for 5 years @ 12 percent	27.74
Gases	Oxygen and propane	36.00
Fertilizer	198 lbs. nitrogen; 201 lbs. phosphate; 396 lbs. potash; 1 ton lime	300.25
Soil fumigant	115 lbs. MC 67:33 @ $1/lb.	115.00
Plastic mulch	2 rolls @ $65/roll	130.00
Transplants	3,000 plants @ $45/thousand	135.00
Cricket bait	20 lbs. @ $0.45/lb.	9.00
Replacement stakes	300 stakes @ $11.50/hundred	34.50
Plastic string	24 lbs. @ $1.05/lb.	25.20
Insecticides	1.13 gals. Monitor; 2.25 gals. Lannate; 2.25 qts. Pydrin; 4.5 lbs. Dipel	240.76
Fungicides	36 lbs. Maneb; 24 lbs. Copper	106.20
Herbicides	2.5 qts. Paraquat; 1 qt. Surfactant X-77	31.00
Labor	18.06 hours tractor labor; 84.8 hours other labor	440.24
Machinery—		
Operation		256.28
Ownership		230.14
Supervision	7 percent of above preharvest costs	154.02
Administrative	4.5 percent of above preharvest costs	105.94
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	103.33
Total preharvest		2,563.61
		Dollars/ carton
Preharvest cost per 25-pound carton	1,200 cartons/acre	2.14
Harvesting and packing:		
Picking and hauling	2.5 cents/lb. harvested; 75-percent packout	.83
Packing	Labor, machinery, supplies	1.42
Carton box		.53
Total harvesting and packing		2.78
Marketing:		
Selling		.15
Total marketing		.15
Total cost		5.07

Appendix table 3—Mature green staked tomatoes: Production and marketing costs in southwest Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$120/gross acre; 50-percent usable area	240.00
Crop insurance	Third level	150.00
Gases	Oxygen and propane	2.73
Fertilizer	393 lbs. nitrogen; 240 lbs. phosphate; 582 lbs. potash; 1 ton lime	463.03
Soil fumigant	220 lbs. MC 98:2 @ $0.75/lb.	165.00
Plastic mulch	3.3 rolls @ $83/roll	273.90
Transplants	5,000 plants @ $33.25/thousand	166.25
Replacement stakes	400 stakes @ $0.13 each	52.00
Plastic string	22 lbs. @ 1.10/lb.	24.20
Insecticides	1 qt. Pydrin; 2.5 lbs. Lannate	69.25
Fungicides	48 lbs. Manzate; 37 lbs. Copper; 3 qts. Bravo	169.50
Bactericide	1.2 lbs. Agrimycin	8.40
Herbicide	1 qt. Paraquat; 2 lbs. Sencor	50.50
Foliar fertilizer	54 lbs. Nutraleaf	32.40
Labor	15.7 hours tractor labor; 89.2 hours other labor	446.04
Machinery—		
Custom services		40.00
Operation		214.94
Ownership		174.33
Supervision	7 percent of above preharvest costs	191.97
Administrative	4.5 percent of above preharvest costs	132.05
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	128.79
Total preharvest		3,195.29
		Dollars/ carton
Preharvest cost per 25-pound carton	1,100 cartons/acre	2.90
Harvesting and packing:		
Picking and hauling		.80
Packing		1.50
Carton box		.60
Total harvesting and packing		2.90
Marketing:		
Selling		.15
Total marketing		.15
Total cost		5.95

Appendix table 4—Bell peppers: Production and marketing costs in Palm Beach County, Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$250/gross acre; 67-percent usable area	375.00
Dump plastic	Hauling and dump fee	15.00
Fertilizer	30 lbs. nitrogen; 70 lbs. phosphate; 388 lbs. potash; 1 ton lime	282.00
Soil fumigant	160 lbs. MC 98:2	113.60
Plastic mulch	3 rolls @ $104/lb.	312.00
Seed	1.5 lbs. @ $43/lb.	64.50
Plug mix	63 cubic feet @ $2.25/cubic foot	141.75
Insecticide	2.5 gals. Lannate; 10 lbs. Orthene	136.00
Fungicide	3.3 gals. Manex; 5 gals. Copper	152.68
Herbicide	3 qts. Paraquat	30.75
Labor	15.8 hours tractor labor, 88.23 hours other labor	442.52
Machinery—		
Custom services	Clean ditches and level land	100.00
Operation		216.42
Ownership		196.58
Supervision	7 percent of above preharvest costs	180.52
Administrative	4.5 percent of above preharvest costs	124.17
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	121.11
Total preharvest		3,004.59
		Dollars/ bushel
Preharvest cost	875 bushels/acre	3.43
Harvesting and packing:		
Picking and packing		1.15
Mobile packing shed		
Ownership		.10
Operating		.05
Wrapping paper		.73
Carton box		.20
Hauling		
Total harvesting and packing		2.23
Marketing:		
Selling		.40
Total marketing		.40
Total cost		6.06

Appendix table 5—Bell peppers: Production and marketing costs in southwest Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$120/gross acre; 50-percent usable area	240.00
Crop insurance	Second level	85.00
Fertilizer	336 lbs. nitrogen; 168 lbs. phosphate; 528 lbs. potash.; 1 ton lime	354.00
Soil fumigant	220 lbs. MC 98:2 @ $0.75/lb.	150.00
Plastic mulch	3 rolls @ $65/roll	195.00
Transplants	20,000 plants @ $17.25/thousand	345.00
Insecticides	8.5 lbs. Lannate; 3 qts. Vydate	164.75
Fungicides	60 lbs. Maneb; 40 lbs. Copper	150.00
Herbicide	2 qts. Paraquat; 8.5 qts. Surfactant X-77	24.63
Foliar fertilizer	60 lbs. @ $0.14/lb.	8.04
Labor	12.53 hours tractor labor; 40.60 hours other labor	230.87
Machinery—		
Custom services		50.00
Operations costs		220.62
Ownership costs		202.61
Supervision	7 percent of preharvest costs	169.44
Administrative costs	4.5 percent of preharvest costs	116.55
Interest costs	70 percent of preharvest operating capital @ 12 percent for 6 months	113.67
Total preharvest		2,820.18
		Dollars/ bushel
Preharvest cost	900 bushels/acre	3.13
Harvesting and packing:		
Picking and hauling		1.03
Packing		1.40
Carton box		.73
Total harvesting and packing		3.16
Marketing:		
Selling		.30
Total marketing		.30
Total cost		6.59

Appendix table 6—Cucumbers: Production and marketing costs in southwest Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$120/gross acre; 50-percent usable area	240.00
Rent beehives	1 hive per acre	20.00
Fertilizer	288 lbs. nitrogen; 96 lbs. phosphate; 456 lbs. potash; 2/3 ton lime	328.15
Soil fumigant	200 lbs. MC 98:2 @ $0.75/lb.	150.00
Plastic mulch	3 rolls @ $65.00/roll	195.00
Seed	2 lbs. @ $47.50/lb.	95.00
Herbicide	1 qt. Paraquat; 3 qts. Amiben; 1.5 lbs. Devrinol	34.35
Insecticide	2.25 gals. Ambush; 2 qts. Monitor	85.00
Fungicide	15 lbs. Manzate; 16 lbs. Copper	46.50
Foliar fertilizer	25 lbs. Nutraleaf	15.00
Labor	12.74 hours tractor labor; 93 hours other labor	446.17
Machinery—		
Operation		199.32
Ownership		185.42
Supervision	7 percent of above preharvest costs	142.79
Administrative	4.5 percent of above preharvest costs	98.22
Interest	70 percent of preharvesting operating capital @ 12 percent for 4 months	63.87
Total preharvest		2,344.79
		Dollars/ bushel
Preharvest cost	500 bushels/acre	4.69
Harvesting and packing:		
Picking		1.18
Hauling		.24
Packing		1.69
Carton box		.76
Total harvesting and packing		3.87
Marketing:		
Selling		.25
Total marketing		.25
Total cost		8.81

Appendix table 7—Bush beans: Production and marketing costs in Dade County, Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$220/gross acre; 2 crops; 83-percent usable area	132.50
Clean wells	Custom hire upkeep: $15/acre	15.00
Fertilizer	40 lbs. nitrogen; 80 lbs. phosphate; 80 lbs. potash	102.50
Seed	85 lbs. Triumph @ $1/lb.	85.00
Insecticide	1 lb. Dipel; 3 qts. Lannate; 2.5 lbs. Orthene	51.75
Fungicide	21 lbs. Manzate; 2 gals. Sulfur	54.64
Foliar fertilizer	2.63 gals. Key-plex	40.69
Labor		44.75
Machinery—		
Operation		57.61
Ownership		48.87
Supervision	7 percent of above preharvest costs	44.33
Administrative	4.5 percent of above preharvest costs	30.49
Interest	70 percent of preharvest operating capital @ 12 percent for 3 months	14.87
Total preharvest		723.01
		Dollars/ bushel
Preharvest cost	140 bushels/acre	5.16
Harvesting and packing:		
Picking and packing	Labor and machinery	3.08
Crate		1.17
Hauling		.10
Total harvesting and packing		4.35
Marketing:		
Selling		.50
Total marketing		.50
Total cost		10.01

Appendix table 8—Bush beans: Production and marketing costs in Palm Beach County, Florida 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$200/gross acre; 2 crops; 67-percent useble area	150.00
Fertilizer	118 lbs. nitrogen; 32 lbs. phosphate; 134 lbs. potash; 1/3 ton lime	95.38
Soil fumigant	8 gals. Varlex	104.00
Seed	60 lbs. Triumph @ $1/lb.	60.00
Insecticide	1.5 qts. Lannate	10.50
Fungicide	3 qts. Manex; 3 qts. Sulfur	9.76
Foliar fertilizer	3 lbs. Nutraleaf	1.65
Labor	5.94 hours tractor labor; 4.09 hours other labor	51.25
Machinery—		
Custom services		45.00
Operation		77.03
Ownership		69.75
Supervision	7 percent of above preharvest costs	47.20
Administrative	4.5 percent of above preharvest costs	32.47
Interest	70 percent of preharvest operating capital @ 12 percent for 3 months	15.83
Total preharvest		769.82
		Dollars/ bushel
Preharvest cost	120 bushels/acre	6.42
Harvesting and packing:		
Picking		1.25
Packing		1.39
Crate		1.11
Hauling		.10
Total harvesting and packing		3.85
Marketing:		
Selling		.40
Total marketing		.40
Total cost		10.67

Appendix table 9—Eggplant: Production and marketing costs in Palm Beach County, Florida 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$250/gross acre; 67-percent usable area	375.00
Dump plastic	Hauling and dump fee	15.00
Fertilizer	510 lbs. nitrogen; 128 lbs. phosphate; 816 lbs. potash	453.50
Soil fumigant	190 lbs. MC 67:33	172.90
Plastic mulch	3 rolls @ $100/roll	300.00
Transplants	5,125 plants/acre @ $36/thousand	184.50
Herbicide	2.5 qts. Paraquat	25.63
Insecticide	3 gals. Lannate; 3 gals. Cygon	189.00
Fungicide	8 gals. Manex; 6 gals. Copper	146.00
Foliar fertilizer	3 qts. Key-plex	45.00
Labor	19.16 hours tractor labor; 57.07 hours other labor	332.61
Machinery—		
Custom services	Clean ditches and level land	96.00
Operation		248.87
Ownership		259.89
Supervision	7 percent of above preharvest costs	199.07
Administrative	4.5 percent of above preharvest costs	136.93
Interest	70 percent of preharvest operating capital @ 12 percent for 7 months	166.96
Total preharvest		3,346.85
		Dollars/ bushel
Preharvest cost	2,150 bushels/acre	1.56
Harvesting and packing:		
Picking and packing labor		.51
Mobile packing shed:		
Ownership		.05
Operating		.02
Wrapping paper		.05
Carton box		.75
Hauling		.23
Total harvesting and packing		1.61
Marketing:		
Selling		.30
Total marketing		.30
Total cost		3.47

Appendix table 10—Summer squash: Production and marketing costs in Dade County, Florida, 1984/85

Item	Description	Cost
		Dollars/ acre
Preharvest:		
Land rent	$220/gross acre; 2 crops; 83-percent usable area	132.50
Clean wells	Custom hire upkeep: $15/acre	15.00
Fertilizer	77 lbs. nitrogen; 128 lbs. phosphate; 172 lbs. potash	100.75
Seed	4 lbs. @ $26.50/lb.	106.00
Insecticide	4.5 qts. Thiodan; 1 qt. Parathion	33.38
Fungicide	18 lbs. Maneb; 18 lbs. Sulfur; 4 ozs. Bayleton	51.15
Foliar fertilizer	3.6 gals. Baythelon	34.20
Labor	7.47 hours tractor labor; 1.22 hours other labor	43.73
Machinery—		
Custom services	Custom spray	3.40
Ownership		49.87
Operation		48.52
Supervision	7 percent of above preharvest costs	43.29
Administrative	4.5 percent of above preharvest costs	29.78
Interest	70 percent of preharvest operating capital @ 12 percent for 4 mo	19.36
Total preharvest		710.94
		Dollars/ bushel
Preharvest cost	200 bushels/acre	3.55
Harvesting and packing:		
Picking	Labor	1.75
Picking baskets	10 tubs/acre $0.70 each	.04
Hauling		.30
Packing labor		.75
Crate		1.08
Movable shed:		
Ownership		.02
Operating		.01
Total harvesting and packing		3.95
Marketing:		
Selling		.50
Total marketing		.50
Total cost		8.00

Appendix table 11—Vine ripe staked tomatoes: Production and marketing costs in Sinaloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed	0.45 lb. @ 121,000 pesos/lb.	54,450	100.20
Greenhouse	Operating costs	66,000	121.46
Machine services	Custom rates	107,707	198.20
Pesticide application			
Fertilizer	350 kg nitrogen; 360 kg phosphate; 220 kg potash	52,500	96.61
Insectides		57,362	105.56
Fungicides		46,796	86.12
Herbicides		12,805	23.56
Scaring birds	Fireworks: 1 bushel @ 1,500 pesos/bushel	1,500	2.76
Cord and wire	120 kg cord, 170 kg wire	46,830	86.18
Stakes	3,700 stakes	20,720	38.18
Labor		151,128	278.12
Supervision	7 percent of above preharvest costs	45,696	84.09
Fees and taxes		16,735	30.80
Administrative	5 percent of above preharvest costs	35,761	65.81
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	31,542	58.04
Total preharvest		782,532	1,440.10
Preharvest costs for export production	75 percent of total production	586,899	1,080.08
			Dollars/ box
Preharvest costs for export production	1,500 boxes/hectare or 607.3 boxes/acre (75 percent of total yield/acre)		1.78
Harvesting and packing:			
Picking	Picking and hauling		.62
Packing	Labor, precooling, warehouse		.17
Materials	Boxes, wax, nails, pallets...		.85
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.10
Total harvesting and packing			2.07
Marketing:			
Crossing costs—			
Duties			.48
Brokers	$0.45/box import broker; $0.02/box export broker		.10
Fees	UNPH, CAADES, state roads, research		.06
Transporting	1,200 boxes per trailer		.88
Commission	10 percent of selling price of $7.57		.76
Total marketing			2.28
Total cost			6.13

Appendix table 12—Mature green ground tomatoes: Production and marketing costs in Sinaloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed		54,450	100.20
Greenhouses	Operating costs	66,000	121.46
Machine services	Custom rates	89,371	164.47
Fertilizer		52,500	96.61
Insecticides		57,362	105.56
Fungicides		46,796	86.12
Scaring birds	Fireworks: 1 bushel @ 1,500 pesos/bushel	1,500	2.76
Labor		96,313	177.24
Supervision	7 percent of above preharvest costs	34,950	64.32
Fees and taxes		13,683	25.18
Administrative	5 percent of above preharvest costs	27,396	50.42
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	24,163	44.47
Total preharvest		599,484	1,103.22
Preharvest costs for export production	50 percent of total production	299,742	551.61
			Dollars/ box
Preharvest costs for export production	500 boxes/hectare or 202.43 boxes/acre (50 percent of total yield/acre)		2.72
Harvesting and packing:			
Picking	Picking and hauling		.62
Packing	Labor, precooling, warehouse		.17
Materials	Boxes, wax, nails, pallets...		.85
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.10
Total harvesting and packing			2.07
Marketing:			
Crossing costs—			
Duties	$0.45/box import duty; $0.33/box export duty		.48
Brokers	$0.08/box import broker; $0.02/box export broker		.10
Fees	UNPH, CAADES, state roads, research		.06
Transporting	1,200 boxes/trailer		.88
Commission	10 percent of selling price of $7.57		.76
Total marketing			2.28
Total cost			7.07

Appendix table 13—Bell peppers: Production and marketing costs in Sinoloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed	3.7 lbs. @ 5,280 pesos/lb.	19,536	35.95
Greenhouse	Operating costs	108,000	198.75
Fertilizer	380 kg nitrogen; 360 kg phosphate; 220 kg potash	56,784	104.50
Insecticides		78,522	144.50
Fungicides		25,221	46.41
Scaring birds	Fireworks: 1 bushel @ 1,500 pesos/bushel	1,500	2.76
Wire	260 kg wire @ 210 pesos/kg	27,300	50.24
Stakes	4,000 stakes @ 7 pesos/stake	28,000	51.53
Machine services	Custom rate	79,880	147.00
Labor		168,153	309.45
Supervision	7 percent of above preharvest costs	43,953	80.89
Fees and taxes		13,886	25.54
Administrative	5 percent of above preharvest costs	34,287	63.10
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	30,241	55.65
Total preharvest	100 percent export production	750,263	1,380.68
			Dollars/ box
Preharvest costs	1,750 boxes/hectare or 708.5 boxes/acre		1.95
Harvesting and packing:			
Picking	Picking and hauling		.46
Packing	Labor, precooling, warehouse		.16
Materials	Boxes, wax, nails, pallets...		1.06
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.10
Total harvesting and packing			2.11
Marketing:			
Crossing costs—			
Duties	$0.73/box import duty; $0.03/box export duty		.76
Broker	$0.11/box import broker; $0.04/box export broker		.15
Fees	UNPH, CAADES, state roads, research		.06
Transporting	800 boxes/trailer		1.31
Commission	10 percent of selling price of $14.63		1.46
Total marketing			3.74
Total cost			7.80

Appendix table 14—Staked cucumbers: Production and marketing costs in Sinoloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed	5 lbs. @ 1,430 pesos/lb.	7,150	13.16
Fertilizer	200 kg nitrogen; 180 kg phosphate; 120 kg potash	29,760	54.77
Insecticides		39,064	71.89
Fungicides		33,628	61.89
Herbicides		8,605	15.83
Scaring birds	Fireworks: 1 bushel @ 1,500 pesos/bushel	1,500	2.76
Cord and wire	160 kg cord; 170 kg wire	56,490	103.96
Spacer stakes	6,760 stakes @ 10 pesos each depreciated over 3 years	22,533	41.47
Stakes	2,250 stakes @ 28 pesos each depreciated over 5 years	12,600	23.19
Machine services		70,210	129.20
Labor		124,347	228.83
Supervision	7 percent of above preharvest costs	30,862	56.80
Fees and taxes		13,891	25.56
Administrative	5 percent of above preharvest costs	24,282	44.69
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	21,417	39.41
Total preharvest		531,339	977.82
Preharvest costs for export production	85 percent of total production	451,638	831.15
			Dollars/ box
Preharvest costs for export production	1,232.5 boxes/hectare or 499 boxes/acre (85 percent of total yield/acre)		1.66
Harvesting and packing:			
Picking	Picking and hauling		.78
Packing	Labor, precooling, warehouse		.18
Materials	Boxes, wax, nails, pallets...		.86
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.11
Total harvesting and packing			2.26
Marketing:			
Crossing costs—			
Duties	$1.24/box import duty; $0.04/box export duty		1.28
Brokers	$0.10/box import broker; $0.04/box export broker		.14
Fees	UNPH, CAADES, state roads, research		.08
Transporting	648 boxes/trailer		1.62
Commission	10 percent of selling price of $15.03		1.50
Total marketing			4.62
Total cost			8.54

Appendix table 15—Green beans: Production and marketing costs in Sinoloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed	176 lbs. @ 230 pesos/lb.	40,480	74.49
Fertilizer	200 kg nitrogen; 100 kg phosphate; 100 kg potash	23,360	42.99
Insecticides		10,241	18.85
Fungicides		1,698	3.12
Machine services		51,830	95.38
Labor		44,139	81.23
Supervision	7 percent of above preharvest costs	14,472	26.63
Fees and taxes		12,495	22.99
Administrative	5 percent of above preharvest costs	11,686	21.50
Interest	70 percent of preharvest operating capital @ 12 percent for 3 months	5,153	9.48
Total preharvest	100 percent export production	250,554	461.07
			Dollars/ box
Preharvest cost	500 boxes/hectare or 202.4 boxes/acre		2.28
Harvesting and packing:			
Picking	Picking and hauling		4.02
Packing	Labor, precooling, warhouse		.26
Materials	Boxes, wax, nails, pallets...		.86
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.27
Total harvesting and packing			5.74
Marketing:			
Crossing costs—			
Duties	$0.10/box import duty; $0.03/box export duty		1.06
Brokers	$0.10/box import broker; $0.04/box export broker		.14
Fees	UNPH, CAADES, state roads, research		.05
Transporting	800 boxes/trailer		1.31
Commission	10 percent of selling price of $15.00		1.50
Total marketing			4.06
Total cost			12.08

Appendix table 16—Eggplant: Production and marketing costs in Sinoloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent	1 lb. @ 3,740 pesos/lb.	35,000	64.41
Seed	Operating costs	3,740	6.88
Greenhouse	350 kg nitrogen; 360 kg phosphate; 220 kg potash	51,400	94.59
Fertilizer		52,500	96.61
Insecticides		80,105	147.41
Fungicides		50,442	92.82
Scaring birds	Fireworks: 1 bushel @ 1,500 pesos/bushel	1,500	2.76
Cord and wire	60 kg cord; 100 kg wire	24,990	45.99
Stakes		25,200	46.37
Machine services		76,250	140.32
Labor		145,453	267.67
Supervision	7 percent of above preharvest costs	38,261	70.41
Fees and taxes		14,387	26.48
Administrative	5 percent of above preharvest costs	29,961	55.14
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	26,426	48.63
Total preharvest	100 percent export production	655,615	1,206.49
			Dollars/ box
Preharvest cost	2,500 boxes/hectare or 1,012.1 boxes/acre		1.19
Harvesting and packing:			
Picking	Picking and hauling		.32
Packing	Labor, precooling, warehouse		.16
Materials	Boxes, wax, nails, pallets...		.96
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.09
Total harvesting and packing			1.86
Marketing:			
Crossing costs—			
Duties	$0.26/box import duty; $0.03/box export duty		.29
Brokers	$0.11/box import broker; $0.03/box export broker		.14
Fees	UNPH, CAADES, state roads, research		.07
Transporting	800 boxes/trailer		1.31
Commission	10 percent of selling price of $6.42		.64
Total marketing			2.45
Total cost			5.50

Appendix table 17—Summer squash: Production and marketing costs in Sinaloa, 1984/85

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		35,000	64.41
Seed	6 lbs. @ 1,045 pesos/lb.	6,270	11.54
Fertilizer	200 kg nitrogen; 150 kg phosphate; 100 kg potash	27,560	50.72
Insecticides		39,064	71.89
Fungicides		25,138	46.26
Scaring birds			
Machine services	Custom rates	40,440	74.42
Labor		79,584	146.45
Supervision	7 percent of above preharvest costs	17,714	32.60
Fees and Taxes		12,595	23.18
Administrative	5 percent of above preharvest costs	14,168	26.07
Interest	70 percent of preharvest operating capital @ 12 percent for 6 months	12,496	23.00
Total preharvest	100 percent export production	310,029	570.54
			Dollars/ box
Preharvest cost	500 boxes/hectare or 202.4 boxes/acre		2.81
Harvesting and packing:			
Picking	Picking and hauling		1.18
Packing	Labor, precooling, warehouse		.17
Materials	Boxes, wax, nails, pallets...		1.04
Machinery	Depreciation, interest, insurance...		.33
Administrative	5 percent on harvest and packing		.14
Total harvesting and packing			2.86
Marketing:			
Crossing costs—			
Duties	$0.30/box import duty; $0.04/box export duty		.34
Brokers	$0.05/box import broker; $0.02/box export broker		.06
Fees	UNPH, CAADES, state roads, research		.05
Transporting	800 boxes/trailer		1.31
Commission	10 percent of selling price of $8.42		.84
Total marketing			2.60
Total cost			8.27

* U.S. Government Printing Office : 1986 - 490-918/40400